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The Manufacture of Armor Plate

Details of the Harvey and Krupp Processes—An American Method Described—Chemical Compositions and Prices Compared

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Since the time of the memorable and original protected fighting ships, the Monitor and the Merrimac, the aim of naval constructors has been toward the design of a floating fortress. This has necessitated defensive as well as offensive armament and has called into use the highest metallurgical skill for developing greater protective coverings. Every advance in ordnance effectiveness has demanded greater resistive powers in armor. The outcome has resulted in the maximum metallurgical development of three classes of material: (1) armor plate; (2) protective deck plate; (3) bullet-proof steel.

The first class—armor plate—requires a plate which shall be sufficiently hard to prevent its being pierced by a projectile and at the same time possess such toughness that it will not crack or break. This is obtained by the use of some special alloy steel of such carbon content and other analysis which shall permit the carbonizing and face-hardening of one side of the plate. Thus the outer section of one side of the plate will have a composition and physical properties characteristic of the hardest and toughest tool steel, and as the depth increases the hardness (as well as the carbon content) diminishes, the steel becoming tougher and more tenacious until it develops into the structure of the original low carbon steel of the back of the plate. The production of such decrementally hardened tenacious armor plate has resulted in the two most noted processes: Harveyizing and the Krupp method. Both of these make use of the principles of cementation (carbonizing) and heat treatment.

A Timely Subject

In view of the fact that our lawmakers at Washington have been agitating again the old proposal to establish a Government armor plate plant, this article has an added interest. It gives many of the details of the manufacture and the composition of various grades of armor plate and shows how prices have varied throughout the world recently. There are some interesting results of a comparative study of the different plates furnished one foreign nation by different makers.

The Harvey Process

In Harveyizing, the ingots are first slabbed to size, either by forging or rolling, and are then planed. For the carbonizing work a gas-fired furnace is generally used, constructed on the car type. One English company uses a furnace of this type 36 ft. long x 21 ft. wide. The car is constructed as usual, with the exception that flues extend from one end of the car to the other, giving opportunity for the under-heating of the plates and out-passage for the waste gases. Two plates, with a layer or mixture of powdered animal and vegetable charcoal between them, are placed on the brickwork forming the flues. Walls are built around the sides of the plates and the whole covered with sand.

The car is then run into the furnace, the doors are closed, and the furnace is made air-tight. Hot gases enter at the back of the furnace, pass over the top of the plates, down the front and through the flues, under the plates, to the chimney. The heat is increased until the proper temperature is reached, and this is then maintained for two to three weeks, depending upon the thickness of case-hardening desired. The carbonization is greatly aided by the continuous pressure of the upper plate, causing the carbonizing material to be kept in intimate contact with the surface of the plates. Upon completion, the plates are allowed to cool in the furnace, an operation taking about a week. After carbonizing, and before hardening, all machine work is done, besides such bending of curved plates as may be necessary. The holes are plugged with fire-clay to prevent injury during hardening. For the final hardening operation the plate is heated to about 135 deg. F., taken out of the furnace and placed on an iron frame-work, and jets of water are sprayed on the hot surface, both top and bottom, at the same time. Sufficient pressure must be used to prevent the formation of steam under the water film.

As above noted, in the original Harvey patents a non-carbonaceous material (sand) was packed on the back of the plate to protect that part from the action of any carbonaceous material and from excessive heat. In this country the use of sand has been gradually discontinued, as it was found that, by a slightly different arrangement of the brick-work, the same result could be accomplished without the use of sand. Since about 1904 no sand or other non-carbonaceous material has been used for this purpose by American companies in the manufacture of armor plate.

The Procedure of an American Firm

The Harvey process as used by one American manufacturer may be described as follows: The plate to be carbonized is mounted face up on brick piers set on the car bottom. These piers are about 18 in. high and are spaced about one foot apart. A row of bricks, two high, is then placed around the plate and the carbonaceous material is put inside these bricks on the face of the plate to a hight of about three-quarters of an inch above the level of the bricks. Mortar is then edged-up on the second bricks. The second plate is then placed on the carbonaceous material face down. The car is run into the furnace, the fire started,

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and the process carried out as usual. As the carbonaceous matter is all contained within the brick box, the gases generated from it are prevented from reaching the side or back of the plate. This does away with the use of sand as mentioned in the previous paragraph.

The Krupp Process

The Krupp process consists in the main in carbonizing by means of gaseous hydro-carbons such as illuminating gas, vaporized oils or similar products. The same general methods are used as in the Harvey process, except that the two plates are separated, the stream of carbonizing gases passing between the plates. A temperature of about 1950 deg. F. is said to be used for the carbonizing work. The plates are then hardened by quenching or spraying with oil or water.

Harbord gives the following details for the treatment of cast armor plate: The cementation composition to a thickness of about three inches is placed between the plates, and the carbonizing process is carried on at a temperature of 1650 deg. to 1830 deg. F. for several days. The plates are cooled slowly in the furnace. After cooling, the plate is again reheated and cooled four or five times with a gradual reduction of temperature each time, and at the final heating is sprayed with oil or water.

Composition of Armor Plate

Armor plate is made with varying proportions of nickel, chrome, manganese, vanadium and tungsten as the alloying elements, and with the carbon content generally comparatively low. A great deal depends upon suitable heat treatment, the adjustment of this factor to the chemical composition of the steel being the prime factor in the production of a proper plate. Krupp plates have an approximate analysis as follows:

Carbon	0.30 per cent.
Manganese	0.70 per cent.
Nickel	3.50 per cent.
Chrome	1.50 per cent.

American armor plate generally has a slightly higher carbon content, besides higher manganese and chrome and lower nickel. Other alloying elements such as vanadium, tungsten, etc., are optional.

Prices of Armor Plate

From a price of $616.24 per ton paid the Bethlehem Steel Company in 1887, the price has gradually fallen materially throughout the world. The latest information on hand at the Navy Department, taken from bids of dates ranging from July, 1910, to those in 1912 on the Nevada and Oklahoma, shows as follows:

Nation	Contractor	Price per ton
Italy	Carnegie	$393.03
Italy	Terni	463.00
England	English firms	445.00
Germany	Krupp	490.00
Japan	English firms	450.00
Japan	Kure	slightly less
Austria	Witkowitz	487.00
United States	Carnegie, Midvale, Bethlehem	420.00

Protective Deck Plate

The second class of protective covering is technically known as "special treatment steel" and is used for protective hull and deck plating, shell-proof partitions, bulkheads for submarine defense, etc. It is differentiated from armor plate by thickness, chemical composition, method of elaboration, and more particularly by heat treatment methods.

Of late years modern naval construction has demanded plates for protective work which shall be both light and strong, and of high resistance to the impact of projectiles, besides possessing maximum physical properties, both static and dynamic. Ballistic tests are being specified with increasing rigor, demanding the highest product of scientific efficiency. To fill this need the production of special treatment steel has been brought about.

Protective deck plate is generally of one to three inches thick, and its efficiency is dependent on the suitable corellation of chemical composition and heat treatment. The steel is first cast into ingots of weight and size best adapted to the size of plates required, and then rolled on a plate mill. This is followed by shearing to approximate size, the grinding away of such imperfections as "snakes," etc. It is then ready for heat treatment.

This treatment differs from the treatment of armor plate in that it does not make use of carbonization with the resultant decrementally hardened plate, but consists of a full hardening operation followed by "drawing" or toughening. The physical properties of the treated plate must be the same throughout the length and breadth of the plate. The treatment is generally carried out in a gas-fired furnace of the muffle or semi-muffle type, usually regenerative, and in which exact and uniform temperatures may be obtained. The plate is charged into the furnace either on a movable bottom or by some suitable mechanical device. Furnaces in use in the United States will accommodate plates as large as 28 ft. long x 9 ft. wide.

The plate is heated slowly and uniformly to a temperature slightly in excess of the upper critical range of the steel, varying from 1400 deg. to 1600 deg. F., and is then removed from the furnace and immediately quenched in some hardening bath, such as water, oil, etc., until cold. This is followed by a reheating or toughening process to an exact temperature which has been previously determined by test or by experience. The plates are then straightened, sheared or machined to exact size, and tested.

Specifications for Protective Plates

The United States Navy specifications for protective plate call for the following physical properties:

Tensile strength, not under 120,000 lb. per sq. in.
Yield point, not under 105,000 lb. per sq. in.
Elongation in 2 in., not under 17 per cent.
Bending test 180 deg. in the cold around its own diameter.

In addition to these laboratory or physical tests, the Government specifies certain ballistic or firing tests. For a plate 1½ in. thick, one round of uncapped shell is to be fired, using a 6-in. caliber projectile with an estimated striking velocity of 1910 ft.-sec., and at an angle of 9 deg. The plate under this test must neither be pierced nor develop through cracks.

An idea of the exactness to which this heat treatment can be adjusted is shown by the following results obtained from tests of two plates of nearly maximum size, and taken from four different parts of each plate:

Test	Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent	Reduction of area, per cent
Plate No. 4				
1	124,850	105,800	20.5	57.3
2	123,800	109,260	23.0	51.8
3	126,300	114,400	20.0	48.7
4	128,300	114,500	19.0	48.0
Plate No. 6				
1	124,900	107,400	21.5	54.8
2	130,820	118,300	20.0	53.1
3	125,000	113,800	22.0	56.4
4	132,400	123,200	20.5	55.1

In connection with this testing work, it is interesting to note that the writer has found that the Brinell hardness test gives a very close approximation of the static tests to be obtained on actual pull-test, and he has used it as a private test preliminary to Government inspection with excellent results.

Composition of Protective Plates

The composition of American-made plates as furnished by two companies will approximate as follows:

Carbon	0.20 to 0.30 per cent.
Manganese	0.25 to 0.60 per cent.
Phosphorus	under 0.04 per cent.
Sulphur	under 0.04 per cent.
Silicon	under 0.15 per cent.
Nickel	3.50 to 4.00 per cent.
Chrome	up to 1.75 per cent.

The use of vanadium in this work is specified by one company in its patents, and calls for 0.10 to 0.25 per cent.

Fea has given the following interesting results from comparative studies of the diverse qualities of plates furnished a foreign nation by different makers:

Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 7.8 in., per cent.	Reduction of area, per cent.	Bend test, degrees	Landgraf-Turner fatigue test	Brinell hardness	Firing scale test
124,400	114,000	12.90	42.3	180	1230	276	I
87,500	64,700	17.50	44.7	136	1144	214	II
69,900	43,200	28.00	62.6	180	960	186	III
104,000	74,300	15.10	51.4	180	1200	235	IV
122,000	80,200	15.05	39.8	167	1536	255	IV
98,600	56,900	17.80	40.7	104	980	202	V

Fea also gives results obtained from Charpy's resilience test and the quality coefficient of Tetmajer, but con-

cludes that "none of the above mentioned tests, not any more than their ensemble, gives a sufficient indication of the resistance which these plates will oppose in firing tests."

Bullet-Proof Steel

This is a phrase which covers a multitude of sins. The steel to be used, in composition and treatment, depends entirely upon specifications, which generally require a certain resistance to the penetration of a given caliber rifle bullet from a stated range and direction. Much of the steel is used on gun-boats which may only be subject to infantry fire from the shore. For a long time a straight untreated nickel steel was used, but of late a heat-treated chrome-nickel or chrome-nickel-vanadium steel is being supplied. Sheets of 0.15 and 0.20 in. thickness are common types in use in South American countries.

Effect of Phosphorus on Cast Iron

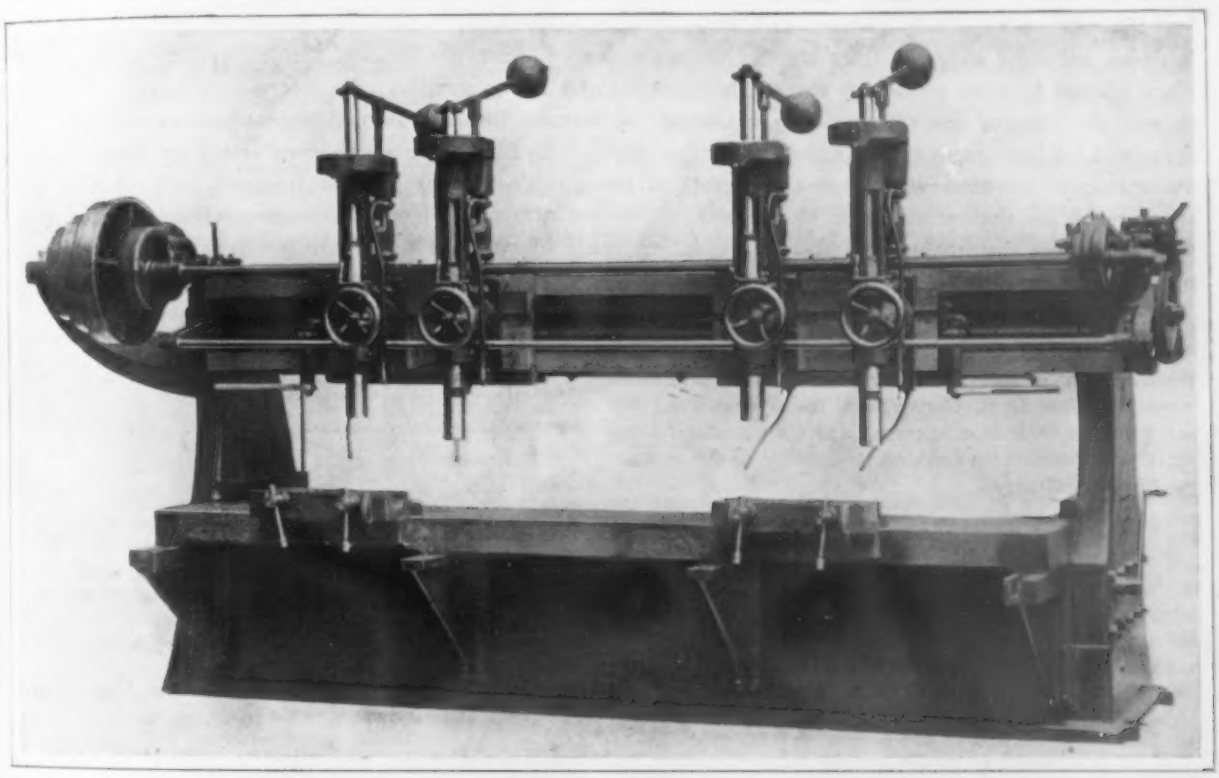
In Ferrum for July, 1913, E. D'Amico gives the results of three series of experiments made on the natural, annealed and chilled material of 12 samples of cast iron with increasing phosphorus content—0.012 to 1.242 per cent. The chemical composition, specific gravity and metallographical characteristics are given. The author's conclusions are: The increase in hardness is nearly proportional to the phosphorus content, about 12 Brinell units per 0.1 per cent. increase. Elasticity is increased about 2.7 kg. per sq. mm. per 0.1 per cent. Tensile strength increases until 0.5 per cent. phosphorus is reached, beyond which it decreases. Expansion and contraction decrease as the tensile strength increases with low phosphorus content; but with high phosphorus they are practically nil. Above 0.24 per cent. phosphorus the metal is very brittle. High phosphorus lowers the electric conductivity.

The new 21-story Railway Exchange Building, St. Louis, which occupies an entire city block, presented a problem in roofing. After exhaustive tests had been made of the principal roofings, the H. W. Johns-Manville Company secured the contract through its St. Louis branch to furnish and apply approximately 67,500 sq. ft. of J-M built-up asbestos roofing. This is built-up on the roof from successive layers of asbestos felts, cemented together and coated with Trinidad Lake asphalt. It is practically indestructible, as there is not a particle of perishable material in it, and is not affected by acids, chemicals, gases or the most extreme weather conditions.

A Four-Spindle Flue Sheet Drilling Machine

For use in railroad locomotive boiler shops and general boiler shops, the Foote-Burt Company, Cleveland, Ohio, has brought out a four-spindle drilling machine. It is designed for drilling the rivet holes around a mud ring and for cutting out the flue holes in a flue sheet. The spindles are of the independent feed type, each having an automatic knock-off to the power feed. They are arranged in pairs and overhang the front edge of the base to take care of the mud ring work.

The spindles have independent feeds and each is arranged with automatic knock-off to the power feed, and a handwheel located on the front of the head provides for their quick return. Separate clutches are provided for starting and stopping the spindles and there is an interlocking mechanism that prevents the engagement of the feed, unless the spindle is in motion or vice versa. Emphasis is laid upon the fact that with this independent feed arrangement some of the spindles are always drilling while the operator is setting the others, thus securing the maximum efficiency of both the machine and the operator, as there is no lost time.



A Four-Spindle Drilling Machine Designed Especially for Mud Ring and Flue Sheet Work in Boiler Shops

A paired arrangement of spindles is employed. They are mounted on auxiliary cross rails and the spindles can be adjusted on the cross rails to a minimum center distance of 8 in. In this way it is pointed out that it is possible to set the spindles to the proper spacing of the rivet or flue holes, and then adjust two spindles along the main rail of the machine, thus maintaining the proper spacing and eliminating the necessity of spacing each spindle individually. To take care of mud ring work the spindles overhang the front edge of the base 8 in. and chucks are provided on the table for holding the work. There is an in-and-out motion of 36 in. provided for the table, which is supported out under the spindles by the bracket slides on the front of the base.

Three changes of power feed are available, any one of which is secured immediately by simply shifting a lever at the right end of the machine. A three-step cone pulley provides for three speed changes, and these are doubled by the use of back gears. The weight of the machine is approximately 21,000 lb.

A large deposit of tin ore, assaying $100 to the ton, is reported to have been discovered northeast of Deming, N. M., by R. N. Hale, of Cameron, Texas, and William O'Toole, of Battle Creek, Mich. The property embraces several hundred acres.

Steel Manufacturers Speak Hopefully

Comments on Business Conditions Accompany Technical Papers at the Chicago Meeting of the Iron and Steel Institute

The meeting of the American Iron and Steel Institute held at Chicago October 25 and 26 gave striking emphasis to the unique and important place this organization holds in its industry. A new high point in attendance was reached at 480 and it is doubtful if any previous meeting has developed to equal extent the atmosphere of good feeling and common interest. The meeting showed again the distinction which belongs to this Institute, of winning regularly the attendance of practically all the leaders in the iron and steel business. The standard of excellence heretofore set in technical contributions was maintained, both in subject matter and manner of presentation, while in the broad scope of the papers on vocational education the thought of the gathering was carried to a high plane.

Expressions regarding political and financial conditions in the country and the status of the iron and steel business, naturally expected from a gathering of such men, were not lacking. In his opening address, Judge Gary alluded to some phases of current law making and administration. He decried demagogy and ill-considered criticism of those engaged in industrial operations. But his essential appeal both in this formal address and his impromptu remarks later in the day was for loyalty to the government at a time when there is a disposition to question whether real progress is being made. General acknowledgment was made by other speakers of the present recession in business, but it was also pointed out that new conditions are being met without serious disturbance and that accumulating needs of consumers that are not now taking the form of orders are bringing closer a resumption of activity.

Over 400 members of the Institute were gathered in the ball room of the Blackstone Hotel on Friday morning when President E. H. Gary opened the first session. For many it was their first attendance at such a meeting and there was comment on the large percentage of the younger men in the industry.

Presidential Address

In introducing his remarks Judge Gary said that the wisdom of liberally sustaining the Institute had been more fully appreciated as time passed. After referring to its various activities in the past year and to the results of the united efforts of the members in putting the iron and steel industry on a higher plane, he spoke as follows:

Your president has heretofore, on many occasions, referred to questions of morals and ethics and patriotism as being of the greatest importance, and has endeavored to apply the principles to the conduct of our daily efforts. We all agree that, in our daily walk and conversation, we should recognize the necessity of upright, honest, fair and loyal treatment toward every one affected by our decisions. There is no intention of departing from or minimizing these principles in what shall be said to-day.

Some Suggestive Figures

However, on this occasion I am disposed to speak briefly of practical business questions which are now in our thoughts and perhaps causing some of us feelings of anxiety. Conditions, opportunities and prospects of an economic nature are attracting the attention of the business men of this country and we are vitally interested in them.

Never before in the history of this country was the opportunity for commercial progress and success so great as it is to-day. Never before were the conditions which promote the material welfare of the people so favorable as they are at present. The people of this country have a decided advantage over the people of every other country if we make the most of it. It is the richest of all countries and the greatest in productive capacity.

A few comparative figures pertaining to this country, England, France and Germany, respectively, will be illustrative. They are not complete but are typical and illuminating. They are approximately accurate.

The total wealth is:

United States	$130,000,000,000
England	80,000,000,000
France	65,000,000,000
Germany	60,500,000,000

The wealth per capita is approximately:

United States	$1,415
France	1,425
England	$1,250 to 1,385
Germany	1,100 to 1,200

I have given the figures recently compiled by Mr. Helfferich, director of the Deutsche Bank in his report to the Kaiser, except that I have given the total wealth of the United States as published in the Statesmen's Year Book for 1913.

The amount of money in the United States, United Kingdom and Germany, respectively, is:

United States	$3,500,000,000
United Kingdom	1,000,000,000
Germany	1,500,000,000

This includes the total of gold, silver and uncovered paper. Figures for France I have not been able to get.

The railroad mileage for 1911, the date of the last publications at hand, was:

United States	246,573
Great Britain	23,417
France	31,391
Germany	38,747

Without stopping to make computation, it will readily be seen that the number of miles is very much larger in our country than in the other countries in proportion to the population of each, and this is an important factor in considering the commercial strength of a nation.

Impressive Facts Regarding the United States

As to the production of wealth in 1912, this country produced in agricultural products alone $9,209,000,000, of which 80 per cent. at least, was in crops. The other 20 per cent., it is estimated, was fed to animals on the farms. In minerals it produced in value $1,918,326,253.

While the figures relating to other countries have not been secured, it is universally recognized that the United States is far in the lead in the production of corn, wheat, oats, tobacco, cotton, petroleum, pig iron, steel and copper; and the location of the United States in a temperate zone, together with the richness of its soil, insures an ever-increasing production of crops on the average; and they are the real basis for expecting the greatest material growth and progress.

Another fact worthy of mention is that the balance of trade between this country and all other countries for the fiscal year ending June 30 amounted to $653,000,000 in our favor.

As a result of our great wealth and material progress, the people generally are better supplied with the necessities of life than those of any other country. There are exceptions depending upon local causes, but generally speaking the people are better fed, clothed and housed; and what is all important, the wages received by the laborer in comparison with the cost of living are far in excess of those of other countries. It is for this reason that immigrants from all parts of the world are coming in by the thousands.

Again, the basis of transacting business has been much improved during the last few years. In passing, it must be admitted there has heretofore been some ground for complaint. This was not local nor did it apply to any particular class or classes. But at present capital is more considerate of labor and *vice versa*. Business men are more frank and fair and honest than formerly in their dealings with each other. Men in power are more thoughtful in their treatment of those who are more or less dependent. Those holding positions of trust have been brought to recognize fully the rights and interests of their beneficiaries and are giving them more information and better protection. The rich are more liberal and more charitable and the poor are more grateful for what they receive. In short, the relations between all are becoming closer and better understood.

We have been passing through a period of transition. The subject is too large to admit of detailed reference at this time, but it is sufficient to say the business world has adjusted or is adjusting itself to new and changed conditions resulting from the great wealth and progress of the country.

Why Does Business Halt?

Now, in view of the great advantages presented to our people, why is it that business prosperity is frequently and seriously interrupted? The peoples of other nations are asking this question; especially those who have money for investment. There are exceptional cases in which mismanagment has caused distrust or dissatisfaction on the part of foreign and domestic capitalists; but this is not the principal reason for hesitancy at the present time on the part of these capitalists in making investments in our securities. They wonder why it is that with our great and growing wealth and resources and our superior advantages we are not more continuously prosperous; why we are not more stable in prices and values and in general conditions; why there is ever any disposition on the part of any one to interfere with the normal and natural progress in the development of our country and its industries. Every one who travels extensively abroad is confronted with these inquiries by foreigners friendly to and interested in our commercial and financial conditions and success; and we assembled in this room are asking ourselves the same questions.

I venture the assertion that it is largely because of much unnecessary agitation and ill-considered criticism by those who have not the nation's best interests at heart. There is too much demagogy, too much mud-slinging. The man out of office criticises the one in office and the one in office in turn seeks to advance his own interests regardless of the effect upon all others. In many public speeches and in magazine articles the author is influenced by motives of selfishness or cupidity. Appeals are made for the purpose of creating a feeling of dissatisfaction and unrest when this is unnecessary and unjustified. Fortunately this is partially offset by the conservative attitude of some of the leading journals, and the number is increasing.

It is not uncommon in public discussions to treat success as an offense; to consider the possession of wealth, however honestly acquired, as wrong. Legislation calculated to create classes is urged persistently; also laws to impose unnecessary and unreasonable burdens; to forcibly take from one something which he has and is entitled to have, and turn it over to another; to prevent or to lessen the success of legitimate enterprise and endeavor.

Capital, always timid, has been seriously affected by this unreasonable and uncalled-for agitation and attack. Indeed, it is becoming frightened. Confidence has been shaken. It is becoming almost impossible to secure, on fair terms, on good security and at a reasonable rate of interest, the necessary capital to equip or liberally maintain going and successful properties, to say nothing of the additions and extensions which the interests of this great and growing country demand.

The stability of business, which is essential to its proper and reasonable growth and success, has been interfered with. Our great and growing population can use our products; it needs food and clothes and material to build; and it is willing and anxious to buy them. It is in need of railroads and ships with the best equipment to carry these products from one point to another and it is willing to pay fair rates for the service. Laborers are willing to work at a reasonable wage and employers are anxious to furnish work and to pay liberal compensation The carrying companies are desirous of providing necessary facilities for adequate transportation. Producers in all departments of industry wish to satisfy the demands for their products at fair prices and to that end they would make the necessary increases in capacity. And those who are able are quite ready to furnish the necessary capital provided they can be certain of protection against loss or risk.

The Country Eager to Achieve

In short, this country, though hesitating, is eager to do business. The volume of business at this time, although large because the country is so vast, is not half so great as it ought to be or as it could be. It is high time for all of us to wake up to a realization of the fact that we are in competition with other countries, who by every means in their power are striving for supremacy; that it is not difficult for us, by good management, to reach the greatest measure of success in competition with other nations of the world and yet that it is just as easy to fail if our vision is narrow, or if we act without due regard to the results.

We would not discourage honest, sincere movements which are intended to maintain a fair equilibrium as to the rights of all classes of people; or those intended to prevent oppression or wrong; or such as may furnish full and equal opportunity to every one to advance honestly and properly his own welfare and pecuniary interests. But at the same time it should not be forgotten that the people of a nation prosper or fail together; that the unnecessary destruction of one or a few adversely affects the whole body; that while the application of the principles of good morals is of the highest importance, nevertheless the man whom it is sought to influence by these considerations lends an unwilling ear unless, at the same time, his material wants are satisfied.

There is placed upon those in power and authority at the present time a very great responsibility. No doubt they will measure up to it.

What I have said has not been uttered with any feeling of despondency. On the contrary, there is ground for optimism. We have, perhaps, been more or less enveloped in clouds of doubt and distrust and hesitancy, but I think we are arriving at a better understanding; that we are approaching the dawn of the greatest prosperity.

Apparently, the leading, most thoughtful and fairest-minded statesmen of the country of all political parties are at present showing a disposition to bring about and to maintain industrial peace and progress. Therein lies reason for hope. So far as we can, let us do our part in holding up the hands of those who have the greatest power and, therefore, the greatest responsibility concerning these most important questions.

Technical and Commercial Papers

Among the technical papers presented, the one by William Whigham on "Fuel Possibilities in Steel Making" was of particular interest in view of the experiments of many companies looking toward greater economies in fuel. The paper relating to "Progress in Roll Design" by T. H. Mathias was also noteworthy, treating of a subject of which the literature is not voluminous. Following is the programme as presented at the forenoon and afternoon sessions:

FIRST SESSION, 10 A. M.

Address by President Elbert H. Gary.

Fuel Possibilities in Steel Making, by William Whigham, assistant to president Carnegie Steel Company, Pittsburgh.

Discussion by William G. Kranz, general manager National Malleable Castings Company, Sharon, Pa.

Treatment of Blast Furnace Flue Dust, by Eugene B. Clark, vice-president and general manager American Sintering Company, Chicago.

Discussion by John W. Dougherty, president Pittsburgh Crucible Steel Company, Pittsburgh.

Discussion by B. G. Klugh, American Ore Reclamation Company, New York.

The Use of Refractories in the Iron and Steel Industry, by Harry W. Croft, president Harbison-Walker Refractories Company, Pittsburgh.

Discussion by A. N. Diehl, superintendent blast furnaces Carnegie Steel Company, Duquesne, Pa.

SECOND SESSION, 2 P. M.

The History and Problems of the Steel Wheel, by John C. Neale, structural engineer Carnegie Steel Company, Pittsburgh, Pa.

Discussion by D. F. Crawford, general superintendent of motive power Pennsylvania Lines West, Pittsburgh.

Progress in Roll Design, by T. H. Mathias, assistant general superintendent Lackawanna Steel Company, Buffalo.

Discussion by Harry L. James, superintendent roll department American Bridge Company, Pencoyd, Pa.

Extras—The Reason and Necessity Therefor, by J. L. Replogle, vice-president Cambria Steel Company, Johnstown, Pa.

Discussion by Henry P. Bope, first vice-president Carnegie Steel Company, Pittsburgh.

Discussion by John L. Haines, assistant to vice-president Jones & Laughlin Steel Company, Pittsburgh, Pa.

Discussion by Charles R. Robinson, general manager of sales Lackawanna Steel Company, Buffalo, N. Y.

Of the above papers and discussions those given on other pages of this issue are on "Progress in Roll Design" and "Extras—the Reason and Necessity Therefor." The length of the other papers and the discussions of them precludes the publication of all at this time, but they will appear in our issues of November 6 and 13. Lantern slides were used in connection with the discussion of B. G. Klugh on "Treatment of Blast Furnace Flue Dust" and that of Harry L. James dealing with "Progress in Roll Design."

A Notable Dinner

Contrary to what was indicated in the daily paper accounts the spirit of the speech-making at the dinner of Friday evening was hopeful. Several of those who spoke referred to the halt in business and to the hesitation apparent in a number of directions but not one of them looked on this with apprehension. Their view was substantially that which came out in the informal discussions of the business situation, as the members met in the intermissions of the day—that while consumers of iron and steel are now waiting and watching, the needs of the country, as indicated by the scale of mill operations, are such as to preclude any great falling off in the rate of consumption.

Apart from the speakers the guests were seated at tables accommodating eight persons each. At the speakers' table were a number of directors of the Institute, members of the local committee of arrangements, and the two speakers whose papers had been scheduled. They were Elbert H. Gary, James A. Farrell, Charles M. Schwab, Cyrus H. McCormick, Edward Bailey, Eugene B. Clark, Frank S. Witherbee, J. G. Butler, Jr., Stephen W. Tener, James A. Campbell, John A. Topping, E. A. S. Clarke, Willis L. King, Theodore W. Robinson, M. Cochrane Armour, Robert P. Lamont, E. J. Buffington, George W. Perkins, L. E. Block, Herbert F. Perkins, Robert Hobson, William H. Donner and Heinrich Koppers.

Papers on Vocational Training

The Institute followed the rule that has governed previous meetings in having formal papers at the dinner on topics other than commercial and technical. T. W. Robinson, vice-president Illinois Steel Company, presented a thoughtful and thought-provoking address on "Vocational Education." It would not do justice to this paper to attempt to synopsize it and it will be given quite fully, if not entire, in the next issue of *The Iron Age*. Following Mr. Robinson, Stephen W. Tener, manager of the accident and pension department of the American Steel & Wire Company, Cleveland, suggested further practical aspects of the subject, and this paper also is reserved for our next issue. One could not help but contrast the reception given these two papers with that sometimes accorded after-dinner efforts in a crowded banquet room. The American Iron and Steel Institute has some distinction in being a body capable of giving earnest attention to a serious subject when the average dinner gathering is in a mood for levity. At the same time the atmosphere of the Chicago dinner, while the courses were being discussed, was notably freer and happier than that of any that preceded. Songs were started at one table and another and there was all the informality of good fellowship. Operating men and salesmen showed that current business conditions had not made any serious inroad on good spirit. Following the practice of other dinners, President Gary called on a number of well-known men following the stated programme. Joseph G. Butler, Jr., commented on the number of young men at the Chicago meeting and their increasing proportion in the Institute membership. He did not omit the usual word about the McKinley memorial and his deep interest in it.

Informal Expressions on Business

John A. Topping, chairman of the Republic Iron & Steel Company, made a brief reference to business conditions. Personally his feeling was hopeful. Speaking of the afternoon discussion on steel extras, he said he was not so much worried about extras as about the base price. One new factor would need to enter into calculations for the future. Whereas Pittsburgh had long been the basing point for steel prices he was not sure that hereafter they might not have to consider Antwerp as a base.

Willis L. King paid a tribute to Judge Gary as the founder of the Institute and expressed confidence in the widening and strengthening of its influence. He hoped the time would come when the Institute would have a home of its own and felt sure that those who succeeded the present-day leaders in the industry would be able to say that the founders had builded better than they knew.

William A. Rogers, Rogers-Brown Iron Company, Buffalo, spoke of the merchant pig iron industry as represented by him in previous speech-making as the "death's head" at the banquet. Again the merchant furnaces were confronted with a condition of over-production resulting from the lack of activity among the railroads and uncertainty as to legislation, and for the time being business seemed at a standstill. However, he thought it was only a state of suspended animation. He believed it would be only a matter of a short time when the obstacles now confronting the industry would be swept away and business would go forward again with new energy. To the pleasantry "We have met the tariff and it is ours," Mr. Rogers added an expression of his faith in the stability of the business structure and reminded its hearers that most of their troubles were those that never came.

Charles M. Schwab admitted that perhaps the views he had expressed on landing from Europe a few days before were too exclusively pessimistic. He had compared notes with others in the industry since he reached Chicago and found they were not seriously apprehensive. Mr. Schwab made some revelations of things he had seen in a dream that brought to the level of humor some of the dignity of his associate directors of the Institute.

George W. Perkins made some observations that were in line with what he had said on other occasions concerning men in public life. "If you were asked to find places for 10 per cent. of them on your payroll at $1200 a year," said he, "you would refuse to pay that price; yet they are dealing with great economic questions whose right settlement has much to do with the welfare of the people of our country." Referring to the illustrations of workmen's homes which appeared in the last issue of the

Bulletin of the Institute, Mr. Perkins said such houses for employees were not equaled in any other country on the globe. "This may not be the garden of Eden but it's a long way nearer it than anything I saw in Europe this summer." Mr. Perkins said, as he had observed before, that there never was a time in the history of the country when precedent meant less than it does today. Business men who are not satisfied with legislation recent and proposed had themselves to blame for going on for years without paying any attention to public affairs.

President Farrell's Hopeful View

James A. Farrell, president of the United States Steel Corporation, spoke of the high character and wide range of the papers prepared for the present meeting of the Institute. As chairman of the committee charged with the preparation of the programme he suggested that members who are asked for papers but are too busy with the management of company affairs to comply, should designate some one in their organization who could meet the demand, or at least could present a subject for a paper. With at present more than 1000 members, the American Iron and Steel Institute, he said, includes many of the leading men in the industry. The importance of their efforts in maintaining and improving the position of their trade could hardly be over-estimated in the economical development of the country. Mr. Farrell had taken care to formulate his views on the business situation and expressed them as follows, reading from manuscript:

A SITUATION CALLING FOR PATIENCE

"A word about business: The situation is one requiring patience; but it can hardly be said that all the pessimism being indulged in concerning business prospects is warranted. The iron and steel mills have been working to substantially their capacity for some months, and naturally a slowing down in production in the interim of assimilation is taking place. As is usual during any curtailment of buying exaggerated reports are current as to prices; adjustments in prices have not extended very far and are not expected to, since the cost of production applicable to manufacturing operations is not likely to undergo very much if any change. The mainstay of the situation continues to be the heavy tonnage which buyers are actually taking out and the material that is ordered is apparently required for immediate use. As a matter of fact, while new buying is not in large volume, consumption seems to have undergone little if any diminution. Consumers' stocks are generally depleted and are being steadily drawn upon, all of which argue well for the future. Aside from these elements, the large increase during the past few years in the exports of manufactured goods reflects an era of expansion in the foreign commerce of the country. This commerce is becoming more and more a factor of large importance in supplementing domestic demand and in stimulating efficiency in manufacturing to cope with the problems presented in securing foreign trade; and the total value of the exports represents a considerable proportion of our favorable balance of trade.

THE NEW TARIFF AND RAILROAD BUYING AS FACTORS

"Newspaper reports have made frequent mention of the probable effect of the new tariff on iron and steel products. The service and quality which our mills and plants can give, in comparison with that to be obtained from abroad, the question of suitable shipment, credits, specifications and standards current in the United States, will undoubtedly have reasonable consideration in the minds of buyers. Railroads have not been buying equipment or track materials to any extent for several months; meanwhile an acute car shortage exists in many sections of the country. It may be a temporary condition, yet it has brought about the placing of orders for many cars and other equipment. With easier money conditions and the necessity of moving the products of the soil, mills and mines, a larger volume of buying of car materials, locomotives, rails and building materials generally is inevitable. A better tone already exists and signs are not wanting that, generally speaking, consumers are rapidly reaching the point when an increased volume of orders should be in evidence.

"Unless the signs of the times are in error, we are not very far from a buying movement which should mark another era of activity in the iron and steel and allied industries, and contribute its share to prosperious business conditions throughout the country."

President Gary in saying the last word referred again to the relations of members of the Institute to each other. He considered their organization to be one to be proud of—one of the greatest organizations in this or any other country, "one that will compare favorably, indeed, with any organization at our seat of government." He counseled loyalty to the government and to those charged with the responsibilities of administration. Having determined what is the right thing to do, working together one for the other and presenting a solid front, they need have no fear of the ultimate outcome. He urged the establishment of the Institute on a foundation of equity and usefulness so solid that it could never be shaken.

A Trip to Gary

A large proportion of the members registered at the meeting took advantage of the opportunity to visit the Gary works of the Indiana Steel Company. The special train left Chicago at 10 o'clock Saturday morning and the return trip was made about 2.30 in the afternoon. The day was a perfect one, quite in contrast with the winter demonstration that visited Chicago earlier in the week. The large extent of the plant made the usual procedure impracticable and for most of the trip at the works the visitors were taken on open works cars, with a special observation car for the ladies. It was an unusual experience for most of the excursionists to be taken on steam cars through an open-hearth building, for example. At the Koppers by-product coke works a considerable stop was made to witness the charging, drawing and quenching operations. Only at the great power house and at the billet and rail mills did the party debark for the close inspection of the equipment and rolling operations. It was evident that the plant was running with somewhat reduced forces. Some furnace rebuilding was in progress in the open-hearth department and a number of ovens at the coke plant were out of commission.

Members in Attendance

The following members of the Institute attended the meeting. In addition a number of persons were present whose applications for membership are pending:

Franklin E. Abbot, William H. Abbott, Oliver J. Abell, Edward M. Adams, Benjamin F. Affleck, Thomas W. Allaway, Robert L. Ahles, Alonzo F. Allen, Edwin A. Amaden, Jay I. Andrews, Eliot Armstrong, M. C. Armour, George F. Alderdice.

Frank Baackes, Charles J. Bacon, Edward Bailey, William M. Bailey, George Baker, William H. Baldridge, Harvey G. Balwin, Webster R. Balsinger, Alexander F. Banks, John C. Bannister, Henry A. Barren, Jacob C. Barrett, Daniel N. Bates, Addison H. Beale, Charles W. Bennett, Quincy Bent, Frank T. Bentley, Louis C. Bibler, E. L. Billingslea, E. J. Block, L. E. Block, P. D. Block, Ernst Boley, James B. Bonner, Louis E. Booth, C. H. Booth, Henry P. Bope, Lee H. Bowman, James Bowron, Lawrence F. Braine, J. W. Brainard, Hermann A. Brassert, Thomas J. Bray, John Penn Brock, Robert E. Brooke, J. J. Brooks, Jr., Fayette Brown, William L. Brown, T. J. Brown, John Brunner, Daniel M. Buck, Eugene J. Buffington, F. A. Burr, D. Fairfax Bush, Joseph G. Butler, Jr., George Bartol, R. J. Beatty, C. T. Boynton.

James N. Camp, Louis J. Campbell, James A. Campbell, Robert W. Campbell, Augustus W. Carey, Perry E. Carhart, Frank D. Carney, Clyde Carr, Walter C. Carroll, John B. Carse, H. S. Chamberlain, Alvah S. Chisholm, Eugene B. Clark, Edmund A. S. Clarke, Charles L. Close, Charles C. Cluff, William G. Clyde, John A. Coakley, Stewart C. Coey, Edgar S. Cook, Edward B. Cook, Daniel Coolidge, Griffith M. Cooper, Charles L. Cordes, Frank Cordes, Henry A. Cornelius, George A. Cragin, E. R. Crawford, George G. Crawford, W. D. Crawford, Henry W. Croft, Harry Coulby, Alfred Crook, David T. Croxton.

H. G. Dalton, John M. Davidson, Charles C. Davis, Henry J. Davis, Stewart A. Davis, William O. Davis, F. D. Day, George E. Day, J. W. Deetrick, Albert T. DeForest, William Dette, Samuel Deutsch, Bradley Dewey, A. N. Diehl, Alva C. Dinkey, Charles E. Dinkey, William H. Donner, John W. Dougherty, David Dows, John Duncan, L. E. Dunham, Samuel Dunlap, L. A. Dietrich, George F. Davie, A. H. Dillon.

George P. Early, William H. Eaton, H. N. Eavenson, J. S.

Elverson, Daniel Eppelsheimer, Jr., H. Cole Estep, Mason Evans, J. H. Edwards.

James A. Farrell, Alvin I. Findley, John B. Finley, W. H. Foege, William U. Follansbee, George C. Foote, William A. Forbes, A. A. Fowler, Lewis W. Francis, Isaac W. Frank, Heinrich J. Freyn, H. A. Fuller, Willard Fuller, F. F. Fitzpatrick, William A. Field.

John E. Galvin, Kirtland C. Gardner, William Gardner, Elbert H. Gary, Emil Gathmann, James Gayley, Robert Geddis, F. C. Gedge, Roland Gerry, Alexander Glass, Thomas K. Glenn, Harry W. Goddard, Eugene G. Grace, Howard C. Griswold, John A. Gross, F. Justice Grugan, James H. Grose.

Edward M. Hagar, Guy A. Hagar, John L. Haines, R. S. Hall, John W. Hamilton, N. V. Hansell, William A. Harris, James L. Hastings, Will L. Hayes, Benjamin P. Hazeltine, J. H. Hearding, Henry W. Heedy, Charles Heggie, Axel H. Helander, J. L. Hench, J. J. Hendricksen, Charles N. Hickok, Harry E. Higgins, Cecil H. Hobbs, Robert Hobson, Alexander L. Hoerr, Arthur S. Hook, William S. Horner, Francis E. House, Elton Hoyt, 2nd, I. Lamont Hughes, John Hughes, Ernest S. Humphreys, Azor R. Hunt, A. F. Huston, A. H. Hutchinson, B. Edwin Hutchinson, O. N. Hutchinson, Thomas J. Hyman, J. A. Hatfield, P. H. Hubbard.

Frederick Ingraham, Robert H. Irons, H. B. Ingels.

P. R. Jackson, Henry L. James, Alexander Jarecki, John C. Jay, Jr., Isaac W. Jenks, William E. Jewell, George W. Jewett, Frank H. Johnson, Lewis Johnson, J. E. Johnson, Jr., Charles T. Johnston, George H. Jones, Jonathan R. Jones, Harry R. Jones, Harold C. Jones, William L. Jones, Richard Jones.

Harry L. Kaufman, J. S. Keefe, John E. Kemp, Hugh Kennedy, John J. Kennedy, Julian Kennedy, David G. Kerr, John P. Kessler, Jr., G. Cook Kimball, Willis L. King, Joseph P. Kittredge, B. G. Klugh, Heinrich Koppers, C. S. Knight, Jr., Luther L. Knox, William G. Kranz, John E. Kreps, S. P. Ker.

Robert P. Lamont, Edward Langenbach, James I. Larimer, Alex. Laughlin, Alex. Laughlin, Jr., John W. Lees, John E. Lewis, William H. Lewis, James Lippincott, John T. Llewellyn, Paul P. Llewellyn, Silas J. Llewellyn, Thomas Lynch, J. S. Llewellyn, Frank J. Llewellyn, F. J. Lanahan, A. M. Lally, James E. Lewis.

Charles Major, William E. Manning, Anson Mark, Charles D. Marshall, Clinton S. Marshall, Charles W. Martin, S. Livingston Mather, John A. Mathews, David R. Mathias, Thomas H. Mathias, James T. McCleary, Cyrus H. McCormick, Archibald M. McCrea, Dilworth B. McClelland, Thomas McDonald, Charles B. McElhany, John McLeod, Arthur G. McKee, Francis C. McMath, Max McMurray, Daniel B. Meacham, John W. Meaker, Jr., Carl A. Meissner, Robert J. Mercur, George Mesta, E. L. Messler, Morris Metcalf, Charles L. Miller, Edwin S. Mills, James R. Mills, Charles A. Moffett, Christopher J. Mogan, George E. Molleson, A. F. Morris, Edmund W. Mudge, Alfred H. Mulliken, Jay C. McLauchlan, C. H. McCullough, Jr., J. H. McLean. W. A. McGonagle, W. F. Meredith, J. W. Murray, Amasa S. Mather, D. A. Merriman, P. W. Moore.

Albert L. Nash, John C. Neale, William M. Neckerman, A. F. Nelson, Peter A. Newton, Robert W. Ney, George W. Niedringhaus, Charles F. Niemann, Frank H. Nullmeyer, Henry P. Nash.

Harry O'Connor, Charles G. Osborne, T. O'Toole, J. S. Oursler, W. J. Olcott.

William P. Palmer, Eugene W. Pargny, Frank E. Parks, John S. Patterson, W. G. Pearce, John A. Penton, Herbert F. Perkins, Ward B. Perley, Leonard Peckitt, N. Petinot, John O. Pew, R. C. Phillips, Jay M. Pickands, Arthur E. Piper, J. H. Porter, William H. Pratt, Charles R. Putnam, David S. Pyle, A. C. Parsons, Henry S. Pickands, George W. Perkins.

Robert Radford, Henry A. Raymond, Samuel J. Reeves, Albert Reichmann, W. C. Reilly, J. Leonard Replogle, John V. W. Reynders, R. S. Rider, Charles R. Robinson, C. Snelling Robinson, Theodore W. Robinson, Willis J. Root, Harry L. Rownd, George F. Rummel, Spencer S. Rumsey, John R. Russel, H. B. Rust, William F. Rust, C. F. W. Rys, William A. Rogers, Charles F. Rand, George L. Reis, John Reis, F. B. Richards, J. A. Ruiloba.

George A. St. Clair, William B. Schiller, Charles M. Schwab, John C. Schmidt, James Scott, J. H. Sheadle, Samuel B. Sheldon, MacGilvray Shiras, George W. Short, John M. Sias, William P. Siebert, Robert Skemp, G. G. Small, C. C. Smith, W. E. Snyder, William P. Snyder, Jr., R. C. Steese, A. A. Stevenson, Malcomb R. Stevenson, Walter C. Stone, Max M. Suppes, R. B. Sheridan, W. F. Schleiter, James I. Stephenson, C. A. Stillman, H. Sanborn Smith.

Benjamin H. Taylor, John M. Taylor, Thomas H. Taylor, Wade A. Taylor, Stephen W. Tener, Charles S. Thomas, Eugene P. Thomas, L. E. Thomas, W. A. Thomas, Alexis W. Thompson, David P. Thompson, George G. Thorp, George Timmins, Fred Tod, William J. Totten, John A. Topping, Chester D. Tripp, T. D. Temple.

Lawrence H. Underwood, John S. Unger.

Arthur P. Van Schaick, Felix A. Vogel, Charles A. Vogt.

William H. Walker, W. R. Walker, John H. Ward, Jacob D. Waddell, George B. Waterhouse, Fred W. Waterman, A. T. Weaver, F. J. Webb, Ernest T. Weir, Samuel T. Wellman, Carl A. Wendell, Leonard Wesson, Seymour Wheeler, William Whigham, Reuben S. White, Frank J. Whitgrove, George S. Whyte, Homer D. Williams, Idris R. Williams, Frank A. Wilmot, James W. Wilson, Frank S. Witherbee, Silas H. Witherbee, Walter C. Witherbee, Walter Wood, L. A. Woodard, Leonard G. Woods, John C. Walker, F. L. Watson, George E. Wisener.

Andrew G. Young, Robert J. Young.
August Ziesing.

In accordance with established custom, the May, 1914, meeting of the Institute will be held in New York. There will be an excursion on the second day of the meeting to some Eastern plant, possibly to the Bethlehem Steel Company's works, at which so much new construction has been completed in the past few years. For the October meeting of next year Birmingham, Youngstown and Cleveland have been named as eligible cities.

Large Texas Steel Plant Proposed

A project of an ambitious character is being formulated for the establishment of the steel industry in Texas. The Southwestern Steel Development Company, Beatty Building, Houston, Texas, announces its plans for the location of by-product coking ovens, blast furnaces and steel mills at Texas City, on tidewater, near Houston. The location will enable ships of deep draft to have access to the company's own docks and wharves.

It is stated that Peabody, Houghteling & Co., a leading bond house at Chicago, is interested with the Southwestern Development Company in the Texas City town site. It is proposed to bring iron ore to Texas City from deposits in Marion and Cass counties in eastern Texas which are estimated to contain 100,000,000 tons of ore suitable for the manufacture of basic steel, having an average analysis of 52.17 per cent. in metallic iron. The cost of this ore on cars at mines is stated to be 70c. and the freight to Texas City is $1, making a total delivered cost of $1.70 per ton, based on the present established freight rate which is expected to be reduced in the near future. The limestone required is available at a cost per ton delivered of $1.65, if brought from Coryell County, but other limestone is to be had at a less cost although not of so high quality. Coal for the by-product ovens is to be brought from the Warrior Basin, Alabama, by an all-water haul and laid down at the company's docks at a cost of $2.25 per ton, delivered. It is stated that the total cost of mining the raw materials, transportation to the assembling point and their reduction into pig iron will not exceed $9 per ton of pig iron produced.

Representatives of the Development Company have been engaged for a year or more in the investigation of raw material conditions for the manufacture of iron and steel in Texas. The results of this investigation have been so satisfactory that a subsidiary company has been organized, to be known as the Southwestern Steel Corporation, with a capitalization of $30,000,000, and preparations are well under way for the financing of this company. The directors of the Southwestern Steel Development Company are as follows: G. W. McElhiney, Henry H. Dickson, vice-president Dickson Car Wheel Company; John H. Kirby, president Kirby Lumber Company; J. M. West, president West Lumber Company; J. F. Wolters, of Lane, Wolters & Storey, attorneys; N. E. Meador, vice-president Bankers' Trust Company; W. E. Jones, Wright Johnson and W. J. Maloney. The officers are as follows: President, G. W. McElhiney; vice-presidents, Henry H. Johnson, John H. Kirby and J. M. West; treasurer, Henry H. Dickson; secretary, Wright Johnson; assistant secretary and assistant treasurer, G. W. McMahon. The chief engineer is E. Gybbon Spilsbury, 45 Broadway, New York.

The electric smelting of tin ore has been tried in Cornwall, England, by the Grondal-Kjellin Company of London, according to the Revue Industrielle. The results were favorable, pure ores giving metal of 98 per cent. purity, while Bolivian ores containing 49.5 per cent. of tin yielded a metal of 92 to 97 per cent. purity.

In comparing vanadium steel side rods with carbon steel rods on five railroads since 1910, the records show that there has been a reduction of 80 per cent. in failures where the vanadium rods have been used. The percentage of failures of vanadium rods has been only three-quarters of one per cent. out of a total of 757 engines.

A Combined Feed-Water Heater and Meter

A combined open feed-water heater and meter has been brought out by the Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia, Pa., which is known as the Cochrane metering heater. In this apparatus the settling chamber of the heater is utilized as the still water or approach chamber for the V-notch weir used to measure the water passing through. The cold admission water valve is controlled by a float in the outflow chamber on the down stream side of the weir, and the open space above the water in the weir chamber is connected to the steam space of the heater by an equalizing pipe, thus giving a self-contained unit which performs all the functions of the open feed-water heater in addition to those of a water meter.

The meter can be supplied in all of the standard forms of open heater. If the headroom is limited or large water storage capacity is required a cylindrical form of heater is recommended, and where only a part of the water is to be metered, two compartment heaters are supplied, or a heater may be arranged to meter two separately used supplies of water. It is also possible to convert open feed water heaters already installed into metering units by adding a weir chamber.

The registering and recording mechanism employed in connection with the meter has already been described in a general way in these columns. A brass rod actuated by a float operates a mechanism which gives a record on a chart on a drum which is revolved once in 24 hr. by clockwork. It is also fitted with a pointer traveling over a scale to give easy means of computing the flow independently of the cam.

Two of these heaters of large capacity have been recently supplied for the new 201st street powerhouse of the New York Edison Company. The discharge of the condenser air pumps is first received in the metering hot well located on the turbine room floor, where it divides and passes in equal parts to the heaters on the floor below. This hot well, which has a total capacity of 1,200,000 lb. of water per hr., receives and divides the make-up water but does not meter it. These heaters which are installed in parallel, both as regards the exhaust steam supply and the withdrawal of the water, have a capacity of 600,000 lb. of water per hr., and by the use of cylindrical shells extra large storage capacity is provided ahead of the feed pumps.

In a test recently made at the works of the manufacturer upon a meter designed to deliver 300,000 lb. of water per hr., an average error of only 0.48 per cent. was found between the water as measured in calibrated measuring tanks and as recorded by the charts of the meter.

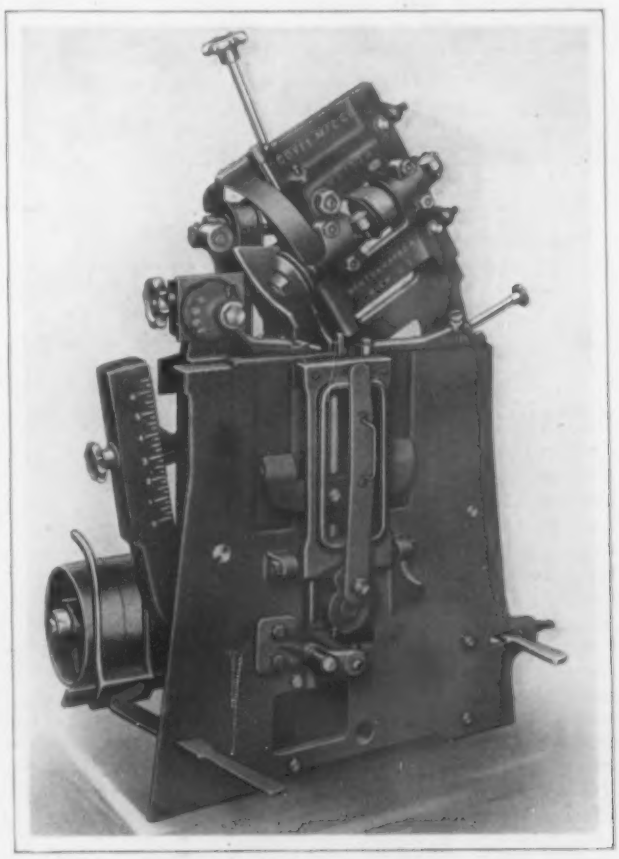
Automatic Band Saw Sharpening Machine

For sharpening band saws with various shapes of teeth, spaced from ½ to 1¾ in. from point to point, the Covel Mfg. Company, Benton Harbor, Mich., has brought out an automatic machine. The number of parts employed is comparatively small, and there are a number of improvements embodied in its construction, such as a direct automatic feeding arrangement, a rigid type of frame construction, the inclosing of worm and worm gear and the providing of a positive control of the lifting lever.

The main frame of the machine is cast in one piece, and all the working parts are mounted thereon, thus giving a self-contained construction. In the operation of the machine this frame is relied upon to take up the strain from feeding the saw or lifting the emery wheel, which it is pointed out does away with vibration. The shafts, cams, rollers and all the bearings are made large, and all of the last have accessible lubricating devices. A feed arm guide which is calculated to make the arm travel in a straight line at all times forms a part of the equipment of the machine.

The head has a 60-deg. angle shaped slide on both sides and wear can be taken up by simply adjusting the gibs. It is made heavy with a view to preventing vibration and large wearing surfaces for the gate are provided. There is a hardened steel shoe for the feed finger which slides on top of the machine and can be easily replaced when worn out. The saw slides on two round, hardened steel pieces which can be used on several surfaces. One of the features of the machine is that all the parts that are subject to wear are provided with replaceable hardened steel pieces. The worm and worm gear, which are of ample proportions, are covered to guard against the entrance of dust, and the former runs in oil.

A number of different adjustments are provided for the machine. The head will accommodate teeth with a hook up to 30 deg. The stroke of the feed finger can be adjusted to take teeth from ½ to 1¾ in. from point to point. This adjustment is automatic with the emery wheel, as it does not change their relation, a feature which is claimed to be exclusive on this machine. It is possible to vary the stroke of the emery wheel at least 50 per cent., which it is pointed out makes the machine quite easy of adjustment and enables any shape and size of tooth within the capacity of the machine to be handled by the three cams that are regularly furnished. A spring keeps the same tension on the emery wheel belt at all times.

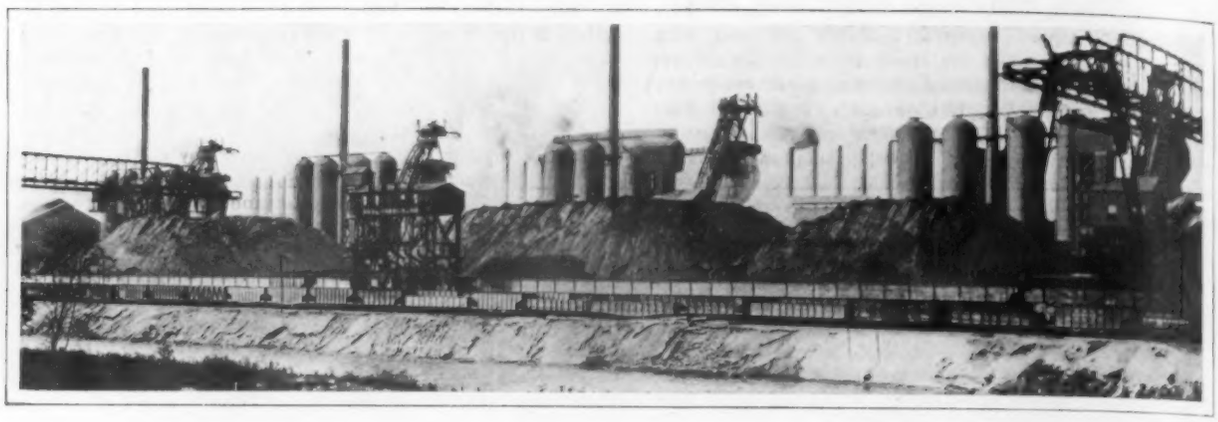


Front View of a Recently Developed Machine for the Automatic Resharpening of Band Saws

The equipment of the machine includes a feed finger stop, two extra cam forms, the necessary wrenches, a set of oil cups and a belt to drive the emery wheel. When the machine is furnished with pulleys and stands, a pair of wood pulleys, 30 in. in diameter with iron lugs to carry the saw, and a pair of bench stands, one of which is adjustable to take care of different lengths of saws and the other stationary, are provided.

A new aluminum alloy called "antoxalumite," which is made by a special process, is claimed, according to the London Times, to be immune from oxidation, corrosion, and, when polished, from tarnishing. The specific gravity is said to be 2.68, while the tensile strength is over 18 tons per sq. in. when rolled, 22 tons when drawn into wire, and 9 tons when cast, when its elongation is 5.37 per cent. The alloy is said to be unaffected by sea water.

A large rubber belt which is to be used for conveying hot cement has recently been made by the Goodyear Tire & Rubber Company, Akron, Ohio. The belt, which is 700 ft. long and 2 ft. wide, weighs 5140 lb. When rolled up at the manufacturer's plant, preparatory to shipping, the belt measured over 5 ft. across.



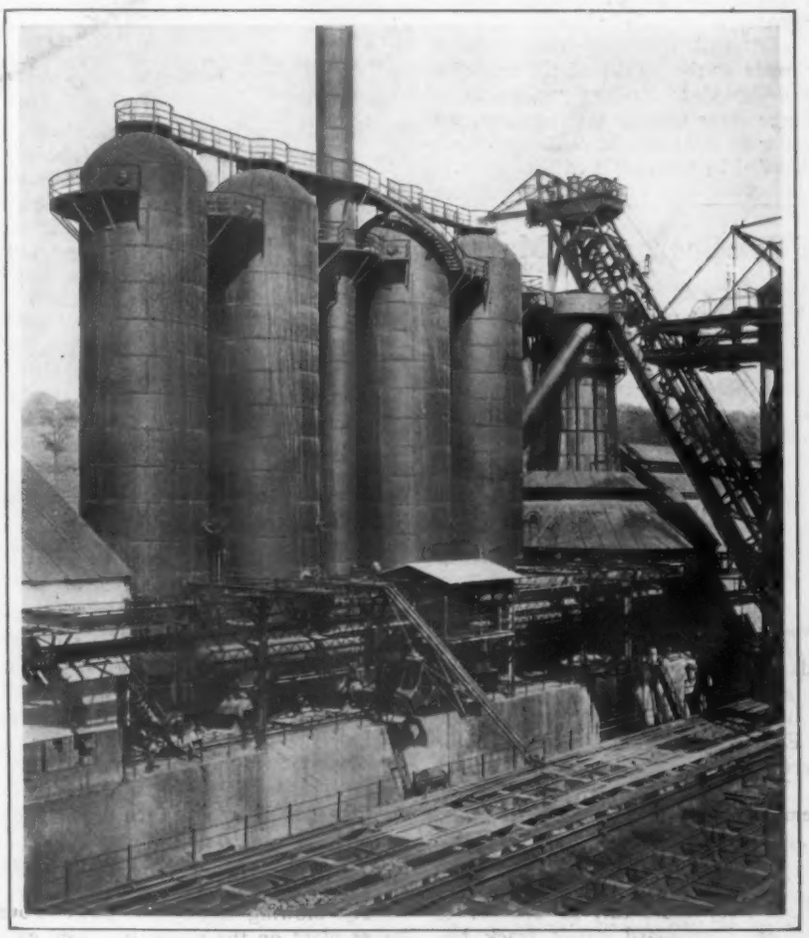
Latest Blast Furnace at Youngstown, Ohio

The Fourth Furnace of the Youngstown Sheet & Tube Company — The Steam Boiler Settings for Using the Furnace Gas

The Youngstown Sheet & Tube Company recently put into operation its fourth blast furnace, furnace D. The four furnaces now owned by the company give it a daily output of 2000 tons of pig iron, but the company may build one or two more blast furnaces, as its need for pig iron is so large that it has to buy regularly from outside furnaces. For example, this year it is taking practically the entire output of Mary furnace, of the Ohio Iron & Steel Company, at Lowellville, Ohio. The entire Youngstown plant was designed by Julian Kennedy, Pittsburgh. Furnaces A and B were blown in in November, 1908, and furnace C in August, 1910. A comprehensive article covering important extensions to the Youngstown Sheet & Tube works in recent years was printed in *The Iron Age* of September 21, 1911, and this account included a large map, covering not only the old and new finishing mills, but the open-hearth furnaces and the four blast furnaces, so that it suffices in the present case merely to describe furnace D, the general arrangement of the furnaces and their location with respect to the rest of the works being given in the map mentioned. Incidentally, a description of the new open-hearth plant and blooming mill was printed in the issue of August 14, 1913.

Furnace D is practically the same size as furnaces A, B and C, except that the inside diameter of the hearth has been increased from 15 ft. 2 in. to 16 ft. The top of the furnace is provided with one large bell, 11 ft. 10 in. in diameter, and a gas hood bolted to the hopper, this forming a seat for the skip bucket when the top slide is removed. The skip bucket is provided with a bell bottom, and the bell is lowered by the over travel of the skip carriage, thus delivering the charge on the large bell. To overcome irregularities in the stock distribution, the skip bucket rests in the bottom of the skip pit on a revolving table, hydraulically operated. The top slide, bell, stock testers, etc., are operated from the hoisting engine house located over the lower section of the skip bridge. The skip is operated by an Otis electric hoist. The platform around the furnace shop is 105 ft. above the yard level.

There are four 22-ft. stoves, 102 ft. high, of the Kennedy two-pass type, with central combustion chamber and a central chimney provided for the battery. The central line of tuyeres is located 7 ft. 10 in. above the hearth level and the furnace is equipped with twelve 6-in. tuyeres and tuyere coolers. The copper cooling plates, of which there are nine rows in the bosh, two rows at the mantel and ten rows above the mantel, are all fed by two manifolds and a combination water trough.



Blast Furnace D and Hot Stoves of Youngstown Sheet & Tube Company

The new furnace, like the others, is of the Kennedy closed top type with four gas outlets leading into two downcomers, which connect to a dust catcher 24 ft. in diameter. From the dust catcher, the gas passes through two 10-ft. Kennedy centrifugal gas cleaners, thence to

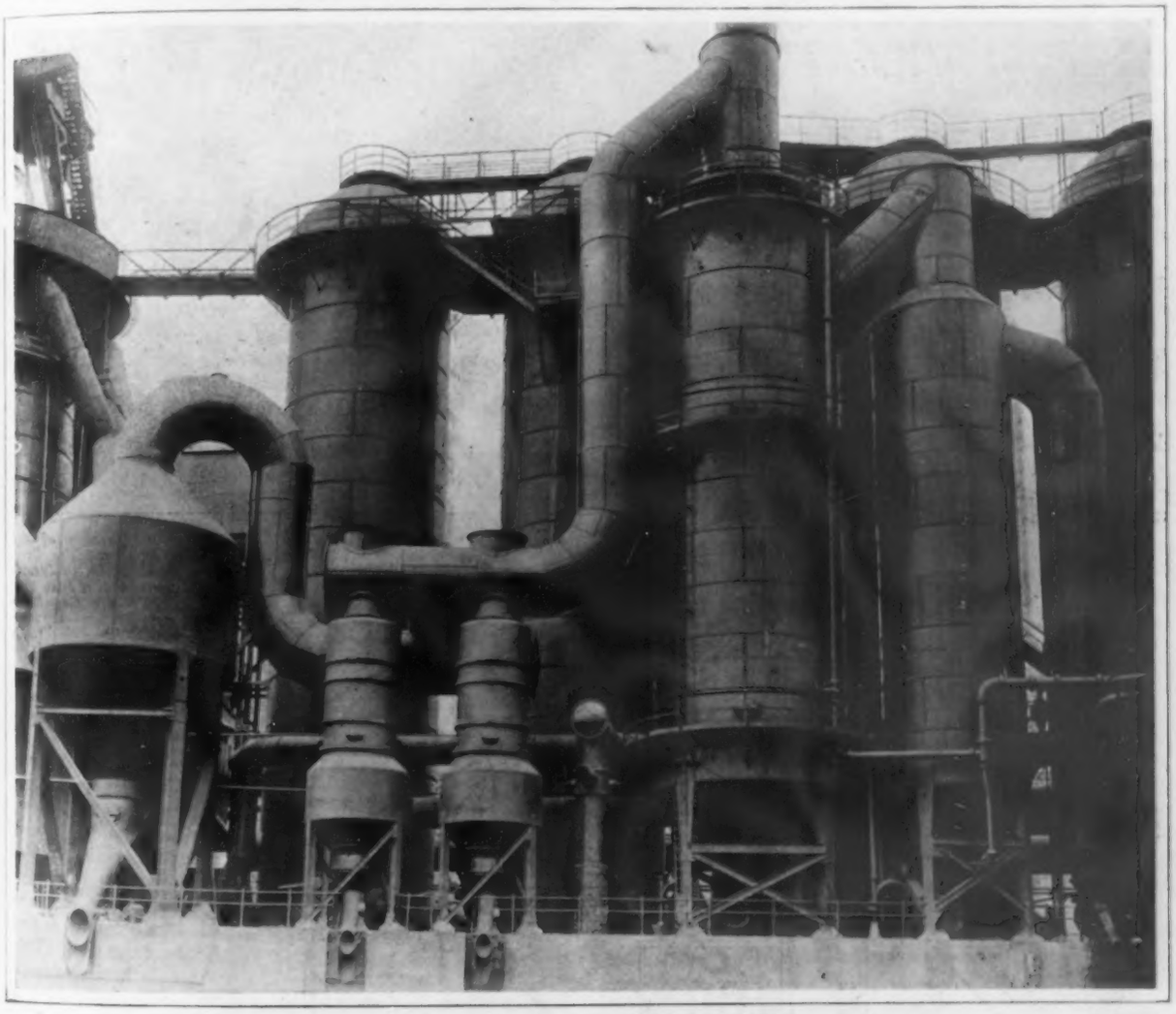
a gas washer 21 ft. in diameter and 77 ft. high. This washer has an inner shell 8 ft. 6 in. in diameter with baffle plates on the outside of the inner shell and on the inside of the outer shell and so placed that the gas passes up through a continuous sheet of water, fed by an 8-in. circle pipe from an outside pipe at the top of the washer. The gas is delivered to a dry tower 15 ft. in diameter by 66 ft. 3 in. high, and thence goes to a 7 ft. 6 in. dust leg, to which the gas main conveying the gas to the stove and boiler house is connected.

The cast house is 76 ft. 8 in. longer than those of the other furnaces. The hearth level is 17 ft. above yard level, thus allowing ample facilities for running off the hot metal or molten slag. The iron runners are arranged to deliver from the north side of the cast house into four ladles, and the molten slag from the two cinder notches is run either into cinder ladles on the south side or to the cinder pit to be granulated. By means of its own railroad facilities and 45-ton hot-metal cars built by the William B. Pollock Company, hot metal can be delivered directly to either the Bessemer or the open-hearth department. A cinder trolley, installed by the Victor R. Browning Company and equipped with a clam shell bucket of 2 cu. yd. capacity, transfers the granulated slag from the cinder pit to standard gauge cars.

The cast house contains a foundry with a spur on the north side leading from the yard trucks. A 25-ton crane, made by the Morgan Engineering Company, with a span of 42 ft. 5¼ in., serves both the cast house proper and the extension.

The stock bin system, south of the group of furnaces, has been extended to include 9 ore and 9 coke bins, designed by Hoover & Mason, which completes the required bin equipment for four furnaces. The stock is delivered into an electric larry scale car, of Hoover & Mason design, running on a standard gauge track beneath the bins, where it is weighed and discharged into the skip bucket. A Foote bin heating system has been installed for furnace D, somewhat similar to that provided for the other furnaces, the heat being furnished from the stove chimney and forced into a steel pipe, extending along the south side of the ore bins, by a motor-driven fan and blower. The ore bins are filled from an electrically operated transfer car, loaded by either of two ore bridges spanning the ore yard and built by the Heyl & Patterson Company. The coke and limestone bins are filled from cars coming in over the trestle approach at either end of the bin system.

The ore yard is parallel to and south of the stock bins and with the present 587-ft. extension covers an area of 207 ft. 9 in. in width by 1644 ft. in length. The total capacity of the ore yard is now 1,200,000 tons, an increase of 360,000 tons. Ore is dumped directly into the yard by a movable Hulett car dumper, designed to travel at a speed of 75 ft. per minute on a runway adjacent to the south side of the bridge runway. The car dumper is capable of handling cars at the rate of one in 2 min., and will dump cars having a maximum weight, when loaded, of 200,000 lb.



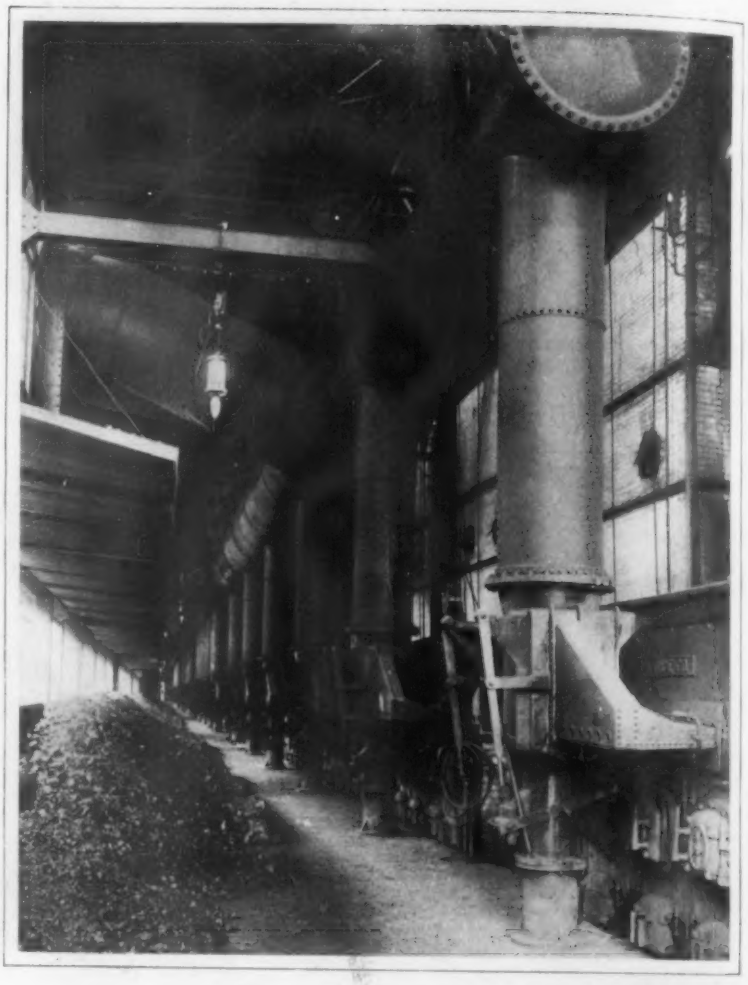
Hot Stoves and Dust Catchers and Gas Washers of Furnace D

There has been added to the boiler plant, located 127 ft. 9 in. north of, and parallel to the center line of the blast furnaces, eight 502-hp. Rust water tube boilers. Each is equipped with a Babcock & Wilcox steam superheater for superheating the steam 50 degrees. The entire boiler plant, comprising 34 boilers, is housed in one building, 42 ft. wide by 902 ft. long. The ashes are removed by three ash handling equipments, furnished by the Heyl & Patterson Company, each consisting of an elevator and storage bin from which the ashes are discharged through three hinged gates into standard gauge cars on the yard tracks.

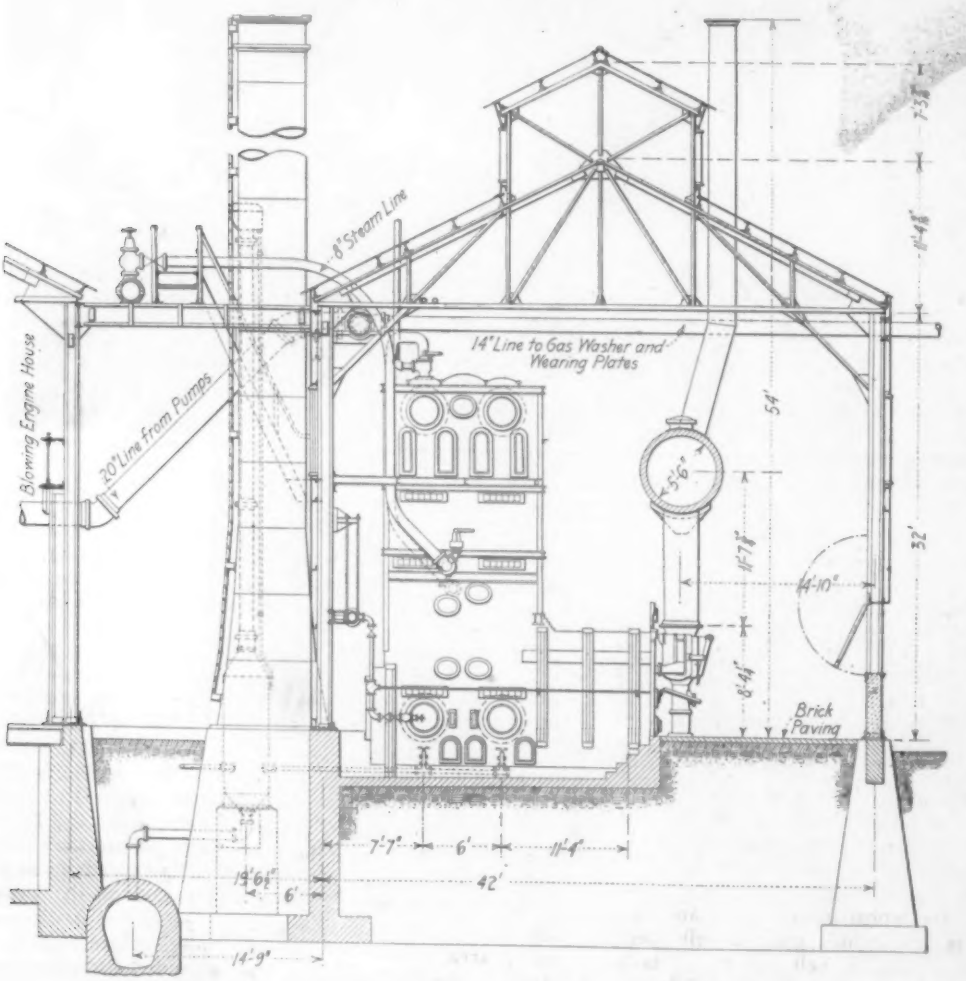
The blowing engine and power house, adjacent to the boiler plant on the north, has been extended for a length of 110 ft., making a building 56 ft. wide by 638 ft. long,

spanned by a 50-ton Morgan crane. Furnaces A, B and C are served by four Corliss cross-compound condensing Tod blowing engines. Furnace D is supplied with air from a turbo-blower built by the Southwark Foundry & Machine Company. The turbo-blower is rated to deliver a constant volume of air at all pressures within its maximum capacity of 40,000 cu. ft. per minute against 30 lb. pressure. The steam turbine is of the Rateau type, using steam at 150 lb. pressure and designed to run condensing with 26 in. vacuum. Turbine and blower are coupled by means of a flexible coupling, the blower being divided into two sections in order to obtain the maximum blast pressure, while running at relatively slow speed. The regulation of the volume of air is accomplished by means of a Rateau pressure multiplier, and maintains a constant delivery with greater precision, it is found, than is usually the case with piston engines. A shaft governor, of the usual fly-ball and spring type, is mounted directly on the shaft of the turbine, closing all steam valves when the maximum speed of the machine has been reached.

In connection with the turbo-blower a 3500-kw. General Electric generator with a turbine of the Curtis type has been installed, and provision has been made for a second turbo-blower and turbo-generator. Both the turbo-blower and turbo-generator run on a 130-in. Helander barometric condenser and two Mesta 14 and 36 x 24-in. dry air pumps. For supplying this condenser a 22,000,000-gal. single-stage motor-driven De Laval horizontal centrifugal pump has been placed in the furnace pump house.



The Gas Burners of the Steam Boilers. The Drop Pipes Are 24-In. in Diameter Inside with a 3-In. Lining, While the Gas Main for the Greater Part of Its Length is 5½ Ft. in Inside Diameter with a 4½-In. Lining. Each Boiler Chimney has a Diameter of 4 Ft. 8 In. Inside of Lining and Is 120 Ft. High Above Boiler House Floor



Cross-Section of Boiler House Showing the Gas Supply to Boilers

The bosh cooling water from the furnaces is piped through a 24-in. main into a sump adjoining a well located in the east end of the blowing engine house extension. This sump is arranged with the connection to the well located below the 24-in. inlet line, thus allowing most of the entrained air to escape before the water enters the well. The water is then pumped by means of two 6,480,000 gal. double-stage motor-driven De Laval horizontal centrifugal pumps placed directly over the well to the gas washer and top wearing plates on furnace D, while provision has been made for connecting the top wearing plates of furnaces A, B and C to this line at the time of blowing out for relining and repairs.

A New 36-in. Open-Side Planing Machine

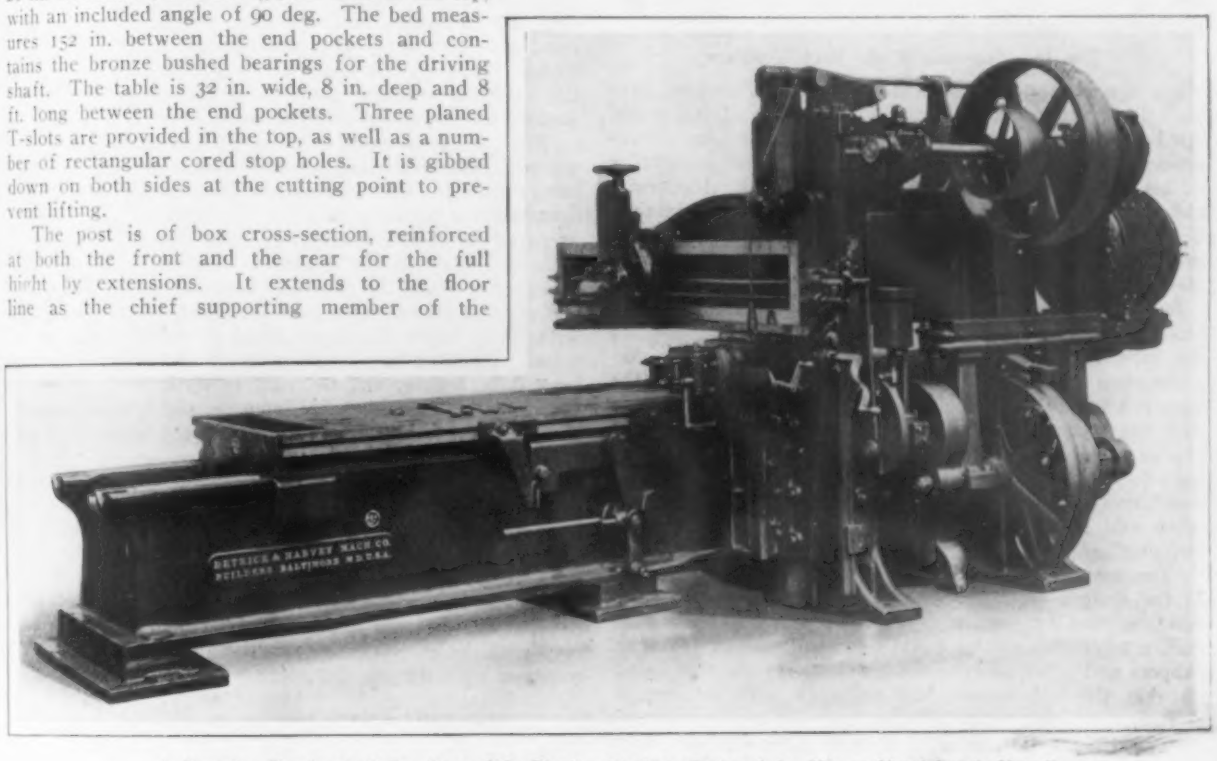
A 36-in. open-side planing machine of somewhat unusual construction has been developed by the Detrick & Harvey Machine Company, Baltimore, Md. This machine was designed to conform to the Government specification for the naval repair ships and three have already been installed. The machine was required to plane a surface 36 in. wide on a piece 24 in. high and 8 ft. long. It is provided with a head on the cross rail, having hand and power, horizontal, vertical and angular feeds, and a side head having vertical hand and power feeds and a horizontal hand adjustment. By placing the cross rail head at an angle, the width of the surface which can be handled by the machine is increased to 50 in.

The bed of the machine is a single piece reinforced by cross girts at short intervals and having suitable lubricating devices for the V's of the table. These are spaced 21 in. on centers, and are 4½ in. wide at the top, with an included angle of 90 deg. The bed measures 152 in. between the end pockets and contains the bronze bushed bearings for the driving shaft. The table is 32 in. wide, 8 in. deep and 8 ft. long between the end pockets. Three planed T-slots are provided in the top, as well as a number of rectangular cored stop holes. It is gibbed down on both sides at the cutting point to prevent lifting.

The post is of box cross-section, reinforced at both the front and the rear for the full hight by extensions. It extends to the floor line as the chief supporting member of the principal parts, and is tongued and bolted to a cheek on the bed, this arrangement of vertical fit being relied on to offer direct resistance to the pressure of the cut and reduce the torsional strain in the post to a minimum. An L-shaped casting, having a vertical leg bearing on the face of the post 11¼ in. wide and 51 in. long, is used for the cross beam. The length of the vertical support of the cross beam is approximately 1 1/3 times that of the overhanging arm, and the horizontal face is cast integral with the vertical leg. A triangular brace secured to the rear surface of the overhanging portion and extending to an inner face on the rear of the post furnishes an additional support for the cross beam, it being possible to securely clamp it in place. The portion of the vertical leg of the cross beam which projects down from the horizontal slideway has a slideway on its front face for mounting the side head, this arrangement being employed to reduce the distance from the cutting tool to its final supporting member to a minimum.

The drive is of the Sellers worm type and the machine is driven by a 10-hp. constant-speed motor. This is directly connected through a silent chain drive to the countershaft bracket attached to the planer post. The countershaft revolves in a plane parallel to the line of table travel and the power is then transmitted through a pair of bevel gears to a diagonal shaft upon which is mounted a multiple thread worm, engaging the rack under the table. The speed of the worm is 2.08 r.p.m. and that of the machine pulley is 7.20, which gives a belt speed under the cut of 57 ft. of 2¼-in. belt per ft. of table speed. The cutting speed is 50 ft. per min., while the return speed is 40 ft. higher. A positive friction type of feed mechanism is employed, which consumes power only when feeding.

The floor space occupied by the machine is 9 ft. in width and 20 ft. in length, including the extreme travel of the table. The over-all hight is 83 in. The machine, together with the driving motor, weighs approximately 21,000 lb.



A Recently Developed 36-In. Open Side Planing Machine Designed for Use on Naval Repair Vessels

The Sherman Law Attacked

At the American Mining Congress in Philadelphia, October 22, Dr. Charles R. Van Hise, president of the University of Wisconsin, arraigned the Sherman anti-trust law as the one agency more responsible than any other for appalling waste in mining and the destruction of the natural resources of the country. To propose the repeal of the Sherman law, Dr. Van Hise said, would be chimerical, but it should be amended so that under its provisions co-operation would be permitted. When the Sherman law was passed, he said, the wheels, so far as co-operation was concerned, were immediately turned back to the conditions of the Middle Ages. To remedy this evil an Interstate Trade Commission should be fashioned with broad powers like those of the Interstate Commerce Commission, to regulate co-operation in industry. Monopoly should be prohibited, but business men should be permitted to fix prices, divide territory and curtail output within reasonable limits. Dr. Van Hise said, in part:

"The wastefulness of the competitive system may be proved with regard to every product which is taken from the earth. But the most disastrous losses in mining, as far as the future of the human race is concerned, are in connection with coal. Under the Sherman act there is no opportunity to limit output, divide territory, or regulate prices. Under the competitive system we are recklessly skimming the cream of the natural resources of a virgin continent with no regard for the rights of our children and our children's children."

The Plank Flexible Shaft Machine Company, Grand Rapids, Mich., has made a change in the construction of its flexible shaft, which was illustrated in *The Iron Age*, April 10, 1913, by the addition of a traveling collar. The object of this collar is to reduce the friction to a minimum, and this result is secured by covering about 25 per cent. of the rotating area. In addition to a reduction in the amount of friction, the change also renders the shaft more flexible.

Progress in Steel Mill Roll Design*

The Evolution of the Designer — The Development of Processes for Making Rails, Shapes and Bars Illustrated in Detail

BY THOMAS H. MATHIAS†

It is impossible to take up the consideration of this subject without at the same time touching on the improvements in sections, mill construction and appliances and steel manufacture, as they have gone hand in hand and are mutually dependent one on the other. The measure of this progress can best be appreciated by a comparison of the record of the past with that which is being accomplished at the present day.

The Development of the Roll Designer

It is a matter of course that the early historians have paid little attention to the roll designer and his work, for he has been slowly developed through a process of evolution. Beginning in the days when he had no personality of his own—when the roller, the machinist, the draftsman, the engineer or the mill superintendent might for the time being lay aside his usual vocation and block out a set of passes for the mill rolls and have these turned up from sketches or crude templets in a corner of the machine shop—he has gradually progressed. And as the iron master's business increased from sheet iron, rounds and square and flat bars to rails and other shapes, this corner of the machine shop became a separate department. Eventually the boss roll turner had an office and, perhaps, a shop for his own use, where he filed out his templets and was in direct charge of all the operations from the necking of the castings to the finished rolls. If he had a little capital he sometimes had a small shop of his own. In any case his office and shop were carefully guarded. The "No Admittance" sign was very conspicuous.

The templets—which were, as a rule, the only record of the designs—were handed out one by one to the lathe hand, so that he seldom saw the whole set together. In fact, a large part of the work was done without templets, calipers and a few dimensions given out by the boss being all that the roll turner had to work with on certain sections.

The designs, if such there were, and the templets were considered a family inheritance and were handed down from father to son as a legacy of great value. That this was the case was largely due to the fact that practically all of the pioneer roll designer's knowledge of his art had been acquired in the hard school of experience. Engaged in a new art with no precedents to guide him, he groped his way along unknown paths. With his own or his employer's money at stake, every step taken was considered carefully. To a bold or a timid man each design meant more or less uncertainty, until he had acquired the confidence born of experience; and every new section successfully rolled was that much additional knowledge and skill to assist him in the solution of the next problem. His employers, having borne the expense and risk of possible failure of certain experiments in this comparatively unknown field, were loath to have their competitors secure the benefit of their experience. Consequently, the roll designer hesitated to give information, and in many cases he was commanded to hold his accomplishments as a secret.

This was the roll designer of twenty or thirty years ago. But modern facilities, systems of acquiring knowledge, convenience of travel and the broadening tendency regarding interchange of ideas and experiences have wrought a big change. And, as the art is still one not of theory but of experience, reliable text books on the subject are conspicuous by their absence. But the designer of today has at his command valuable data from the records of the last quarter century. He is also familiar with what his contemporaries are doing. The records of his own designs are complete; the tonnages made on rolls are accurately recorded; trade journals supply him with general plans and descriptions of the new mills and improvements to the older ones. He has a well-lighted office and shop, equipped with electrically driven lathes for turning the heaviest and lightest rolls; roll and tool grinders; surfacing, planing and milling tools; overhead cranes; skilled tool and templet makers; high-speed tool steels; complete drawings and accurate templets for the shop men, and everything that contributes to the higher efficiency. It is a great stride from the little dark corner of the old-time machine shop of a generation ago to the present well-equipped establishment.

But "to whom much is given, of him shall much be required." The roll designer has become the censor of all things rollable. He is required to meet the present day demands for accurate and perfect sections. He must be prepared to design successfully and roll intricate shapes without injury to the material. The demand for large tonnages requires the greatest reduction during the rolling period, and at the same time he must exercise care that with these heavy drafts no unequal strains occur in the metal. He must have courage to do that which has never been done before, and the skill to do it well. While he has progressed considerably from the old time methods, he has much yet to master before his art can be dignified with the name of a science.

As a general rule the roll designer has not been an inventor in the sense that he originated new designs that have had in them the elements of troublesome rolling, for he would, naturally, be the first to discern difficulties; but it cannot be denied that he has made progress and has met the demands made upon him. With the knowledge we have of the designer and his equipment, we will now proceed with the results of his designing in the early days and continue with that to the present day.

Early Patents on Rolling Methods

As early as 1697 rolling mills were referred to as "late improvements in the iron trade." The pages of history for the next hundred years are dotted with patents on rolls couched in language showing the crude conception of the art. For instance, in 1728 a patent was issued to an Englishman for rolls which were to have "A notch or furrow on their surface for forming blooms and bars into various shapes." In 1759 another was granted in England on "rolls for shapes." In 1783 another for "Appliances to be used for squeezing slag out of blooms and for finishing iron into shapes."

It appears that sheets, flats, rounds and squares were rolled more or less successfully during the latter part of the eighteenth century. It was in the early part of the nineteenth century before the rolling of iron into more complicated shapes was actually begun, and it is from this time that we are able to trace with some degree of certainty the gradual changes and progress of roll designing. The designs for roll grooves up to within the last thirty years, and in some plants to a still more recent period, were generally laid out on a sheet of metal and the templets cut therefrom, first the finishing pass, then the preceding, and so on back to the bloom.

If the designers of the early days realized the importance of their pioneering, they would undoubtedly have left us more complete records; but, as a rule, history makers are not history writers. A studied effort seems to have been made to avoid putting these on record, and this makes the matter of obtaining outlines of these old designs almost impossible. It is only within recent years that any accurate records have been obtainable, so far as we are able to learn. Therefore, with a few exceptions, we will be able to present only the finished product of the early designing, i. e., the outlines of the finished section.

*Paper presented to the American Iron and Steel Institute, Chicago, October 24.

†Assistant general superintendent, Lackawanna Steel Company, Buffalo, N. Y.

First Types of Rails

Naturally, the pioneers had their attention drawn to that which afterwards became one of the greatest factors in modern civilization and progress, namely, the railroad rail, and their first attempt in this line was rolled flats from 2 to 4½ in. in width, and ½ to 1¼ in. in thickness, and these were known as strap rails. This was about 1808 to 1810.

By 1830 the strap rails passed through many changes of section, some of them resembling a slice off the head of our present tee rail, others approaching the general form of the old street railway stringer rail. The American roll designers and engineers had not as yet awakened to the possibilities ahead, but in England, about the year 1820, a patent was granted for the rolling of malleable iron rails, the section of which, together with the roll passes as given on the patent office papers, were about as shown in Fig. 1. This rail was probably the original of the type of sections now generally known as the American tee rail.

In the year 1830 an improvement was made on this design, and the Clarance rail was rolled. This type, with its modifications, gradually led up to the English bull head rail of 1844 and the larger and improved bull head of more recent years.

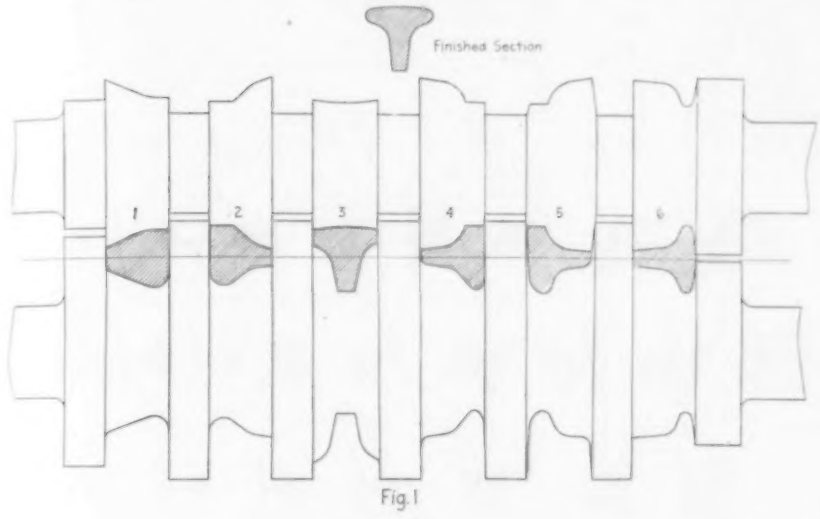


Fig. 1

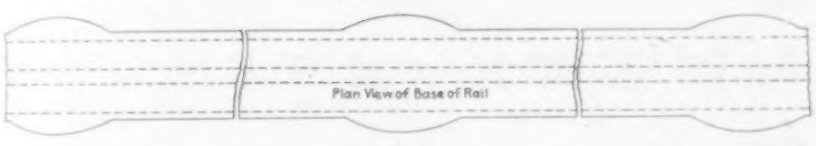


Fig. 2

Fig. 3

Fig. 4

Fig. 5

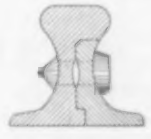


Fig. 7

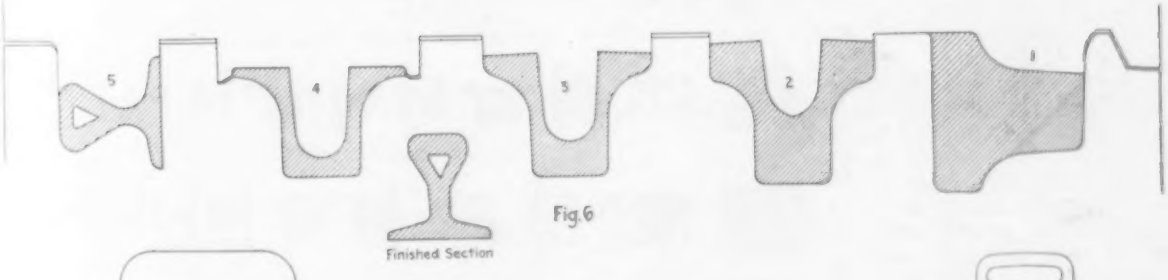


Fig. 6

67 Lb. Rail from 8½x8½ Ingot 1867

Fig. 8

67 Lb. Rail from 24"x20" Ingot 1913

Fig. 9

Fig. 10

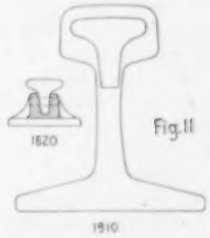


Fig. 11

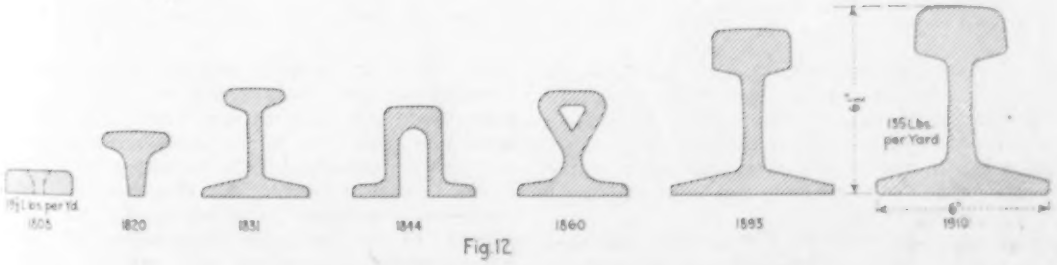


Fig. 12

The Steps in the Changes of Rail Sections and the Designs of Rolls

First Designs of Tee Rail

But about 1831 an American engineer named Stevens designed a rail which was to do away with the expensive chairs required for the Clarance rail. The head of this rail was similar to the top of the English tee rail but to it was added a base or flanges of varying width, as shown in Fig. 2. The projection was to be rolled at intervals of two feet, and was to be the point of support on the tie, but this feature was found impractical and was abandoned. The roll designer saw that this was not a rolling proposition and presumably refused to design rolls for it, although these rails, as modified, were afterwards rolled in England, but only after the engineer had put up a money forfeit to cover any possible damage to the mill while rolling them.

Following this, in 1835, there was used on American railroads another type of rail which shows considerable advance in the roll designer's skill. This was the U rail, of which there were many designs, all of which were made in England up to about 1844, when a 40-lb. rail of this type was made at the Mount Savage Iron Works in Maryland. An outline of this rail will be found in Fig. 3.

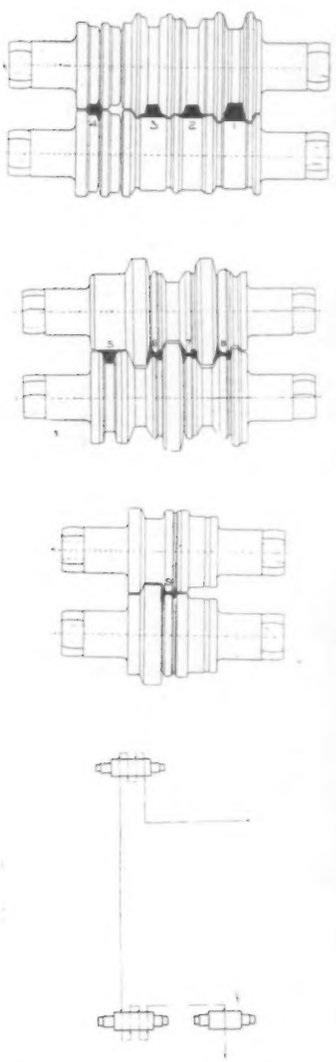


Fig. 13—The Three Stands for Making Standard Rails

The pear headed rail shown in Fig. 4, which followed next in 1845, and of which a large tonnage is said to have been rolled in the several years following, was a simpler section to roll than the U rail and was accepted as a standard. It was an apparent standing still or marking time of the roll designer's art.

In 1858 rolls were designed and turned for a pear headed rail provided with a recess for the top and bottom end of a plain splice of fish bar, as shown in Fig. 5. A year later a rail was made of the pear type but rolled similar to the U type rails and closed in or welded together at the web, as shown in Fig. 6, on which is also shown the design of passes. These were made at the Cambria Iron Works.

Compound Rails

The first compound rail, as shown in Fig. 7, was designed and rolled about 1856. This was the forerunner of different types of two-piece rails, all of which, however, were abandoned, as it was found they would not give service. But this fact has not prevented many inventors, from that time to the present, from endeavoring to produce a two-piece rail that would be serviceable.

In this period, when so many compound rails were rolled, the roll designer undoubtedly acquired valuable experience in the rolling of different sections. But aside from this no great strides were made in rolled shapes for some time, other than a gradual increase in the rail size.

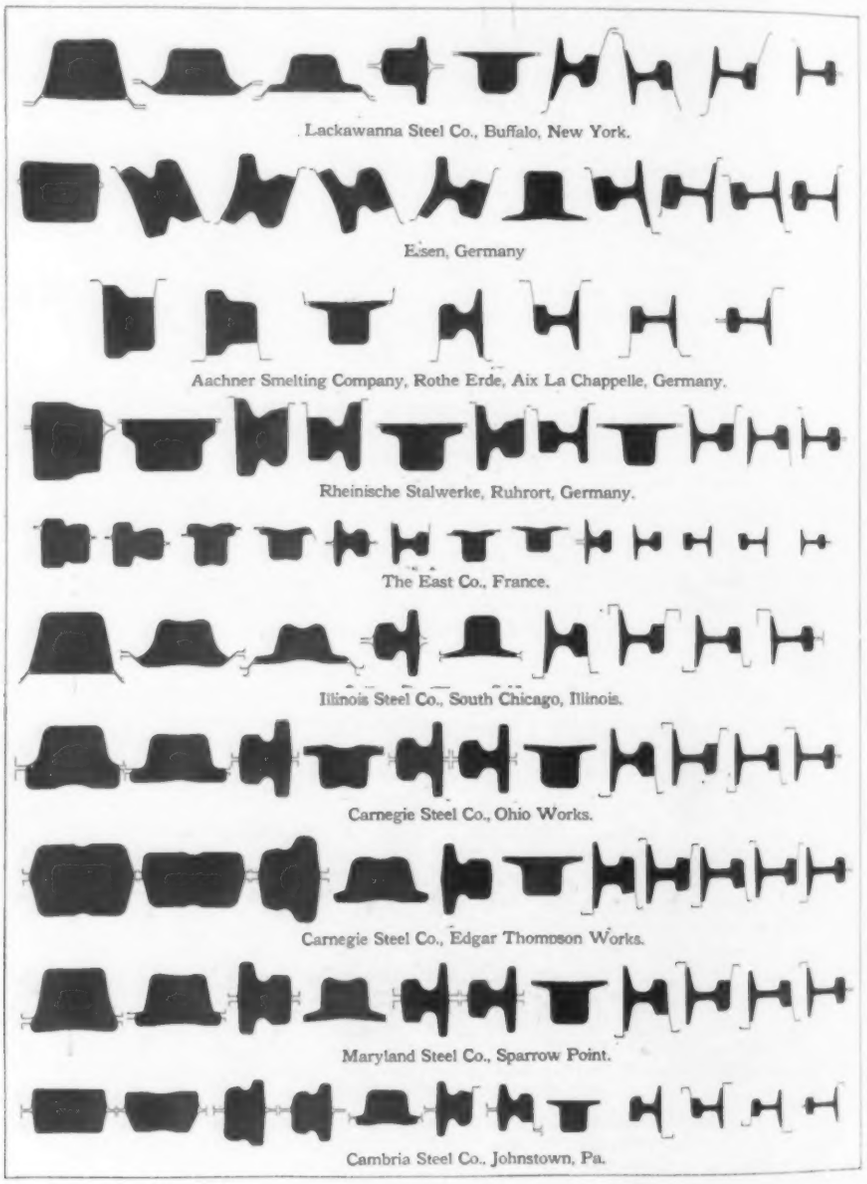

Lackawanna Steel Co., Buffalo, New York.
Eisen, Germany
Aachner Smelting Company, Rothe Erde, Aix La Chappelle, Germany.
Rheinische Stalwerke, Ruhrort, Germany.
The East Co., France.
Illinois Steel Co., South Chicago, Illinois.
Carnegie Steel Co., Ohio Works.
Carnegie Steel Co., Edgar Thomson Works.
Maryland Steel Co., Sparrow Point.
Cambria Steel Co., Johnstown, Pa.

Fig. 15—Comparison of Present American and F oreign Designs for Making Tee Rails

In 1857 a three-high mill for rolling rails was installed at the Cambria Iron Works. This marked a decided advance in the progress of roll-designing and rail mills in general. On this mill the first Bessemer rail order was rolled in 1867. The section was a 4½-in. high 67-lb. rail with a 4-in. flange, made from an 8½ x 8-in. ingot which was reheated and hammered or rolled to a 6½ x 6½-in. bloom.

It is interesting to note the relative size of the ingot and rail as compared with the ingot and rail of today, as shown in Fig. 8.

Following this a demand was made for rails with a large percentage of metal in the head and less in the

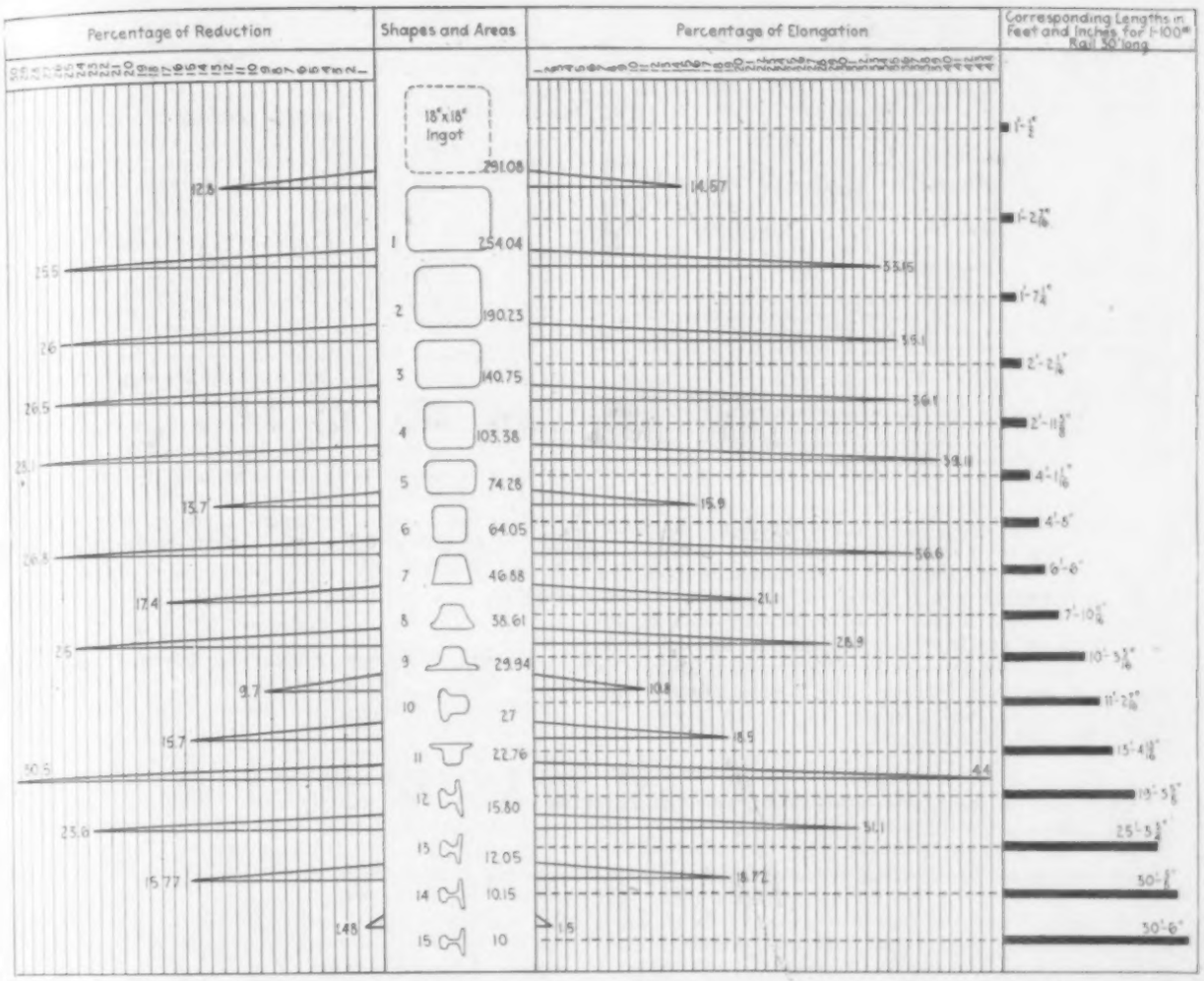


Fig. 14—Reduction in Areas and Corresponding Elongation in Making a Rail at Lackawanna Steel Company. One Pass in No. 1 Blooming Mill, One Pass in No. 2 Blooming Mill, Four Passes in No. 3 Blooming Mill, Four Passes in Roughing Mill, Four Passes in First Finishing Mill, Diagonal; One Pass in Second Finishing Mill.

flanges, 50 per cent. in the head being recommended. For a sketch of this rail see Fig. 9.

The roll designer's hand is again shown by the fact that the railroad manager met with considerable trouble in placing a contract on account of the risk in rolling such thin flanges. This is not surprising when we recall that fresh in their minds were the troubles they had in rolling flanges of any kind on the old two-high iron mills, on which the flanges frequently separated and encircled the rolls or split when a little cold. It may be noted that there are few rails of this size today made with flanges as thin as the then proposed section, though it would not be considered a difficult flange to roll now.

About 1879 a small tonnage of rails was made from a box or pile in which the outside pieces were of iron while the inside was filled with scrap steel turnings, punchings, etc. Also during this year an iron rail was rolled with a steel head, an outline of this section being shown on Fig. 10.

Railroad Trackage and Rail Improvement

It is of interest to note in 1844 there were about 4000 miles of railroad track in the United States; in 1870 this had increased to 44,000 miles. From this it is easily seen that successful rolling of the rail contributed a great deal to rapid development of this country.

From the year 1867 the tee rail has gradually been improved through the quality of material, larger and faster mills, mill appliance and tables, larger ingots, greater and more equivalent drafts, resulting in more regular reductions of metal, less tearing of flanges and a greater uniformity of section, until at the present time the rail mills of the country are producing rails which pass the most rigid inspection.

For a comprehensive idea of the various stages of development of the present-day American rail, see Fig. 11.

For the original tee rail of 1820 as compared with the largest rail made in 1910, see Fig. 12. This last rail was made at Steelton.

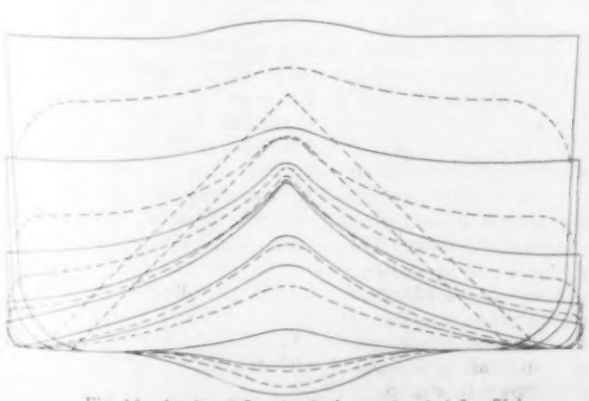


Fig. 16—An 8 x 8 In. Angle from 13 x 8½ In. Slab

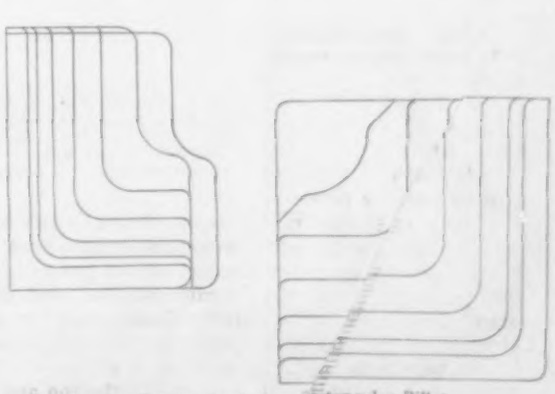


Fig. 17—Rolling Angle from Rectangular Billet

TWO METHODS OF ROLLING SMALL ANGLES.

E. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

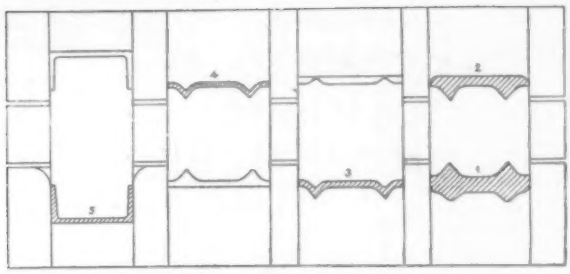


Fig. 18—Rolling a channel by Carnegie, Klowman & Co., at Upper Union Iron Mills, 1873. "A new way to make parallel channel iron. Make templet of sheet lead full size with shrinkage included. Bend as above around a plug (3⅛") until it reaches a straight line. The above is a correct sketch of widths and diameters 3-high 20-in. train, ½ in. larger than pinions. I work first groove top and bottom as you will see, but not the others. Just tried them today and work well. Rolls 6 ft. long. The bar works without turning over. Muck iron very red, short crushes out on edges and cracks. I will work best iron narrow bars on the edge, if we cannot get good cold short. The above 10½ channel is quite parallel without the slightest taper. Made it first rate without any alteration."

For the general design of passes and rolls for the rolling of a standard tee rail from the bloom to finished rail, see Fig. 13. On this the letter a represents the roughing, b the intermediate and c the finishing stands of rolls, while d represents a plan view or diagram showing the direction of the bar from pass to pass. As an illustration of the reduction in areas and corresponding elongation in lengths of bars, see Fig. 14. For a comparison of the various American and foreign designs for making tee rails at the present time, see Fig. 15.

Angles

Among the earliest of the rolled shapes were the small angles. There are two distinct methods of rolling this section. One is to use a square billet and work off one corner and recess it, retaining the opposite one for the back, and the other two for the legs of the section. The second method, and the one used generally, is to use a rectangular bloom or slab and work up the back or apex, at the same time reducing the thickness of the bar as a whole.

There are many variations of this latter method, some designers preferring to keep the legs flat until the last or finishing pass, while others work the passes from the slab so that each successive one approaches the right angle of the finished bar. A reference to Figs. 16 and 17 will show the difference in the two methods, each having its advocates among roll designers.

The most important feature in the rolling of angles is the back or apex, which must be square and sharp. Difficulty is frequently experienced in securing the apex, due to the desire to produce too many weights from a given set of passes, the tendency being for the apex to run round or to bevel off on the heavy weights.

Channels

Channels can be and are sometimes rolled from the slab, being rolled flat for the first few passes, and at this stage resemble two angles rolled side by side, but as this method permits of a very limited range of weights from one set of passes, it has been superseded in a general way by the bloom method. An illustration of the slabbing or butterfly method is shown in Fig. 18. This, you will observe, was made in the year 1873, and is believed to be the first attempt to roll channels by this method.

Attention is called to the description of the then new method, and it is to be noted that these channels were rolled from a built-up pile, and bars of a better quality of material were used at the point where the channel was subject to the greatest rolling strain.

The present-day rolls for channels are usually designed to take a partly shaped bar from the beam roughers, working off the flanges on one side of the web. Recently rolls have been designed for rolling large channels direct from the bloom, as shown in Fig. 19, although for certain sections of channels with specially long flanges a shaped bloom is sometimes used, as, for example, the 13-in. car truck channel made in seven passes at the Homestead Works, as shown in Fig. 20. Fig. 21 shows the passes for a 3-in. channel rolled from a 4 × 4-in. billet in seven passes.

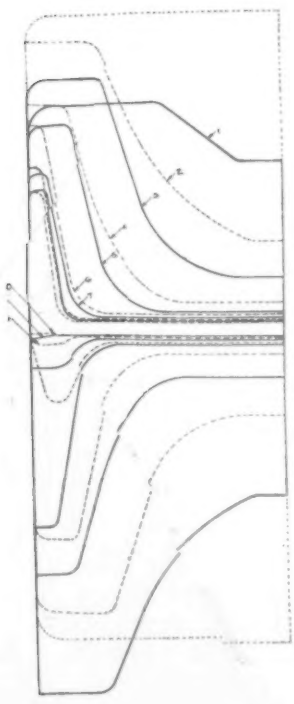
Beams

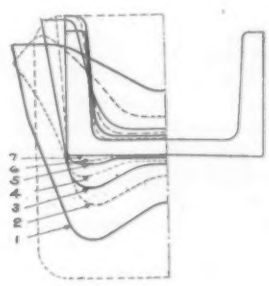
From information at hand we find that beams were rolled in 1845. We further learn that large beams were first made by bolting or riveting two channel sections back to back. This manner of producing a beam is known to have been done in Wales in the early part of 1860, so we feel justified in making the assertion that progress has been made in the manufacture of this particular line of sections, since the largest beam today is a rolled section.

In the rolling of structural shapes, considerable progress has been made in the design of rolls to reduce the number of passes necessary to produce the desired section. An example of this is shown in Fig. 22, which illustrates the rolling of a 7-in. beam from an 8 × 6-in. bloom, the earliest design requiring 16 passes, whereas today it is rolled in 10 passes on the same mill from the same size bloom.

Several distinct methods of rolling beams have been in use. For many years the regular straight-collared roll was the only type in use, but some thirty years ago the so-called diagonal or oblique method was adopted by some designers. This is shown in Fig. 23, which shows a 4-in. beam made in diagonal grooves.

One of the supposed advantages of this style of groove is that when dressing the rolls, the roll turner is able to smooth up the worn sides and then close up the width of pass as much as is needed to bring the rolls to their original form, by shifting them endways. The feature which is thought to be an advantage in dressing is a disadvantage in the handling of the rolls in the mills, as the





PRESENT DAY ROLLING OF CHANNELS

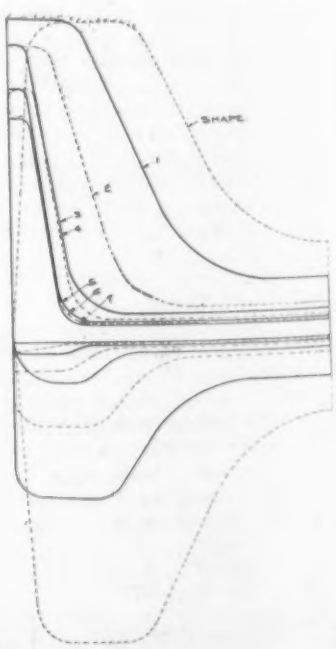


Fig. 19, at the Left, Shows the Rolling of a 10-In. Channel in 10 Passes from 8 x 11½ In. Bloom; First Five Passes on 10-In. Beam Roughers; 35-In. Mill. Fig. 20, at the Right, Shows the Rolling of a 13-In. Car Truck Channel from Shaped Bloom with 3-In. Web; Made in 7 Passes. Fig. 21, in the Middle, Shows the Rolling of a Special Channel from a 4x4-In. Billet

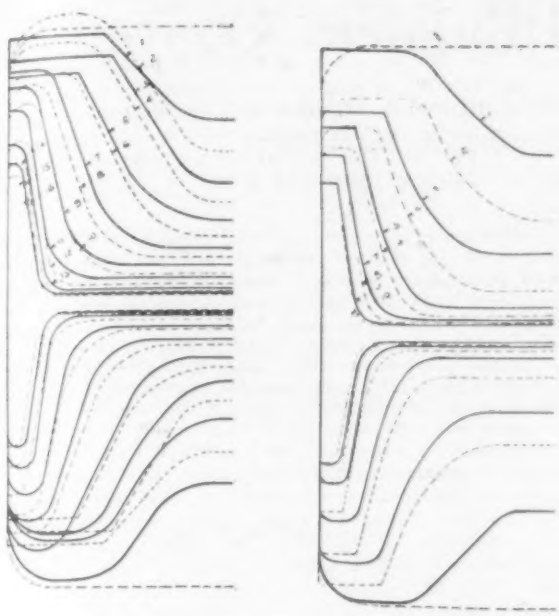


Fig. 22—Rolling a 7-In. Beam in 1895 and Today.

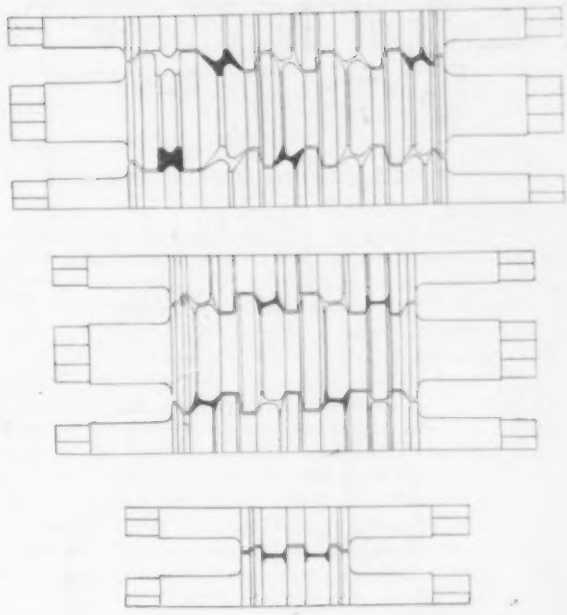


Fig. 23—The Diagonal Method of Rolling Beams

tendency is for the bar to crowd the rolls open, creating undue strain on the roll seats or bearings. However, this trouble is being overcome by judicious drafts, proper distribution of metal and attention to the angle of the oblique pass flanges, though there seems to be but little advantage in it for sections which can be rolled successfully on the older type of rolls.

But a greater and more advantageous feature of this oblique design of pass is that it insures the possibility of securing a length of flange greater than is obtainable in the ordinary manner of rolling long-flanged sections. Without the slabbing effect of this oblique pass many of the sections now rolled on certain types of mills would be difficult to produce. The importance of this will be shown later in connection with other types of sections.

Improvements in Beam Designs

The great demand for beam sections in structural work has led to much thought in regard to their manufacture. A few years ago beams were considered very difficult to roll. At that time the roll designer seemed to think that the more crowding that could be done in the solid grooves, the better, but since 1893 or 1895 these flange designs have been gradually modified, until today the standard beam gives as little trouble as any section rolled. There is a call for a new type design of beam from 8 to 27 in. in depth, with extremely light gauge webs and thin flanges, all of which make them a very difficult problem to roll, but it is to the credit of the roll designer that the beam is already a merchantable bar, and while there is still more to be desired in the way of reducing the tendency to buckle in the web, however, the section is now rolled successfully.

A great stride in the rolling of large beams was made in the conception, development and erection of the first Grey mill in Germany, followed with the building of a more modern and greatly improved mill of the same type at the Bethlehem steel plant. This mill has opened new possibilities in the rolling of beam sections, both in the length and taper of the flanges, Fig. 24, due to the fact that the use of vertical rolls in the same vertical plane with the top and bottom horizontal rolls permits of side work on all flanges simultaneously with the web drafts.

The ingots for this mill, for beams 24 in. wide and over, are cast to a rough beam shape and are calculated to conform very closely to the same proportions as regards flanges and web as on the finished bar (though one sized blank is used for two widths of sections). This maintains the flange and web about equal in length, resulting in very small crop ends. All blanks are made about 8 in. wider than the finished beam, as shown in Fig. 25. The blooming rolls for these large shapes are designed with an ingot and a finishing groove only, but for the 20-in. beams and smaller there are three grooves, the forming having a swell in the center of web about 1 in. high, as indicated in Fig. 26.

Beams of extreme flange widths, which would be utterly impossible on the regular open and solid flange rolls, can be easily made on the Grey mill, and for this type of sections there is a growing demand. For the roll designer, this type of mill is a simple problem, much depending on the shaped bloom and the rollers of the mill.

(To be continued)

The length of pipe cared for by a standard Badger expansion joint is given in tabular form, according to the pressure carried in the pipe, in a new catalogue issued by E. B. Badger & Sons Company, Boston, Mass., and devoted to the corrugated copper expansion joint. This table is as follows:

Gauge pressure	Cast-iron pipe	Steel pipe
5	115	100
15	100	90
25	90	80
50	110	90
80	100	85
125	90	75
150	85	70

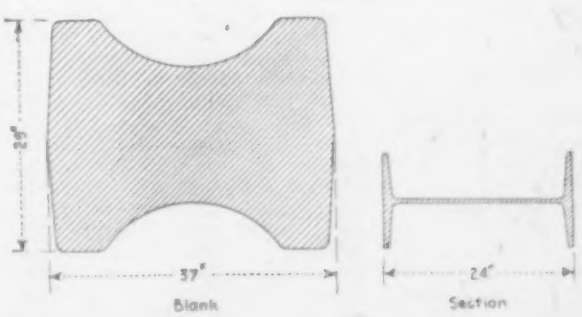


Fig. 25—Ingot Shape for Large Beams

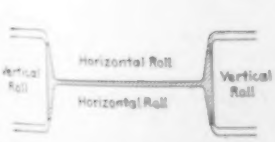


Fig. 24—Rolls for Grey Mill

Fig. 26—Blooming Rolls for 20-In. Beam

National Machine Tool Builders' Convention

W. A. Viall Elected President—An Intimate Discussion of Sale Guarantees of Machinery —Proposed Change in Name Deferred

The annual meeting of the National Machine Tool Builders' Association, at the Hotel Astor, New York City, last week, was an unqualified success from the standpoint of attendance and representation of interests and from that of the importance of the addresses and discussions. The programme possessed unusual interest.

William A. Viall, Brown & Sharpe Mfg. Company, Providence, R. I., was elected president, succeeding E. P. Bullard, Jr., who completed two years of very successful administration; J. B. Doan, American Tool Works Company, Cincinnati, Ohio, first vice-president, and Daniel M. Wright, Henry & Wright Mfg. Company, Hartford, Conn., second vice-president; Albert E. Newton, Reed-Prentice Company, Worcester, Mass., treasurer, and Charles L. Taylor, Taylor & Fenn Company, Hartford, Conn., secretary.

The matter of changing the name of the association, as suggested by the Committee on Nomenclature, to the Metal Working Machine Makers' Association, was deferred to the next meeting.

It was voted to hold the usual spring meeting in 1914 at a place to be determined by a letter ballot of the members. The places urged are Atlantic City, N. J.; Worcester, Mass., and Buffalo, N. Y.

The Standardization Committee will be increased to consist of three members from each committee, representing a division of the industry, and acting as sub-committees to make definite study of details of machinery as to their needs of standardization. This committee was formerly made up of one member from each subdivision, and, in fact, its sessions will be attended only by chairmen of the sub-committees.

Appropriate action was taken on the death of James Mills, Smith & Mills Company, Cincinnati, Ohio.

No new members were reported. The matter of the establishment of a mechanical section was not brought up.

On Thursday evening members and others in attendance at the convention were the guests of the American Machinist at a theater party.

A Plea for Machine Hour Rate

Clinton H. Scovell, Clinton H. Scovell Company, Boston, Mass., read a paper on "Cost Accounting Practice, with Special Reference to Machine Hour Rate," in which he stated, in part:

The manager of a machine shop cannot make a greater mistake in figuring costs than to charge a higher burden in any form whatsoever for the operation of part of his equipment, because the rest of it is temporarily idle, or a higher rate for a smaller labor force because the plant is working on part time. These differences which have always attracted the attention of observing managers are almost entirely clear loss, or waste, and should be recognized as such and charged directly to the profit and loss account.

The following table shows the results of working out a machine hour rate for direct operating burden in a plant operating about 150 machines:

Number of machines	Rates in cents	Number of machines	Rates in cents
6	1.5	2	14
4	2.0	11	15
9	2.5	1	17
4	3.0	3	18
6	4.0	1	19
2	5.0	1	20
4	6.0	1	22
10	6.6	4	23
12	7.0	3	24
12	8.0	2	25
7	8.7	1	26
4	9.0	1	29
3	9.5	2	30
10	10.0	1	47
3	11.0	1	52
13	12.0	1	76
2	13.0		

There is practically no more work in the cost accounting department in using five rates instead of two. Moreover, if an effort is made to combine some of these rates, it is exceedingly hard to say which rates should be raised and which should be lowered. If five rates like those mentioned above should be brought together, some of the rates will be at least 15 per cent. out of the way. Such an error is altogether too large to be tolerated unnecessarily, when one is seeking for really accurate costs.

At the plant where these rates are in force the burden for erecting hands, including the charges for floor space, crane service and supervision, was five times the rate for bench hands. In addition to these rates every employee participates in a general burden which includes superintendence, managers, drafting, cost accounting, and all general charges, except those connected with selling expenses.

Selling Guarantees

George O. Gridley, Windsor Machine Company, Windsor, Vt., read a paper on "Selling Guarantees, What Are Safe Limitations?" which opened a most educating discussion. He said, in part:

No transaction between seller and buyer is satisfactory, and no business is, nor can it be, successful if the relation between the seller and buyer is not satisfactory to both. Neither is any guarantee satisfactory unless it safeguards the interests of both parties to the transaction. Therefore we must draw our guarantee carefully and see that its language is such that it means to the one to whom we are giving it the same that it means to us.

In the case of the builder of a machine, which is specially designed for the purchaser, your guarantee should be drawn very clearly and definitely so as to safeguard both parties, because there are many elements over which the other has no control that enter into and influence the decision of the purchaser as to whether he will accept or reject the machine. With the manufacturer of a standard line of tools which he builds in lots, and which are not built specially for each individual customer, it is different, and it is not necessary to have the guarantee so definite as in the case of the builder of the special machine, because if one does not want the machine he can sell it to another.

There are, of course, cases where a definite guarantee of performance is necessary, and it should be given, such for instance as where the question of costs of a new product is being considered or where a change of methods is being taken up; but, where only an increase in product is to be made without change of method, the limited guarantee should not be given. Make your guarantee broad and short, and without limitations. It is better for your customer, and for yourself, because it will cost you less to maintain such a guarantee than any in which there are limitations so drawn that you may feel that you have met your guarantee and that your customer should keep the machine, even though he does not want to do so.

GUARANTEE TO COVER A CUSTOMER'S NEEDS

Your guarantee should be such as to assure your customer that he is getting that machine which will best serve his purpose. This does not necessarily mean that he is getting the best machine of its kind, because the most accurately made machine and the one which will do more work than others, and necessarily cost more than others, might not be best for the purchaser, as he might perhaps need and could use to better advantage that extra money which the best machine would cost; therefore, we should not try to force on him this high priced machine. In fact, we should not try to sell it to him, because a cheaper machine would be better for him to purchase.

If, however, you have been so fortunate or so unfortunate as to have taken his order for the high priced machine, and after getting it into his shop, he realizes that there is only a little work for it, and that the work need not be accurate, and that a cheaper machine would have been better for him to buy, what do you do if he comes to you, and states the case clearly and honestly; do you take it back or not? If you take it back, your guarantee with safe limitations has not been of any financial benefit. If you do not allow him to return it, what happens? If he is honest with himself, he pays the account when it is due and then when he requires more machinery he will probably go to your competitor and place his order with him.

Can your loss on this order placed with your competitor under these conditions be charged to anything other than the cost of maintaining your limited guarantee? I say it cannot and that it should be charged against that

account. Open an account in your books under the heading "Cost of Maintaining Limited Guarantees" also one under the heading "Cost of Maintaining Unlimited Guarantees," and see which costs you the more. You will find that the unlimited guarantee costs less than the other.

The company with which I am associated has made a great many limited guarantees, as well as broad ones, and I am frank to state that the limited guarantees cost us the more to maintain. It costs us less to secure an order with the limited guarantee than the one with the broad and unlimited one. This is because it takes a higher degree of salesmanship to get an order that way, although it seems on first consideration that it should be the opposite.

To secure an order with the broad unlimited guarantee, you must first convince your prospective customer that you have the best machine for his purposes. When you have done that, your guarantee of performance, which is a limitation, is of secondary consideration, and the question of whether or not the machine will make 4 or 44 pieces in a given unit of time is not made the main issue, as it should not be; but consideration is given to the question of whether or not the machine is the best machine for the purpose. If it is the best for him, all things considered, your guarantee has not cost you anything to maintain, neither will it cost you anything on future sales, and, in addition to this, the cost of getting future sales will be greatly reduced, and you can, therefore, credit the saving in securing these sales to the "Cost of Maintaining Unlimited Guarantees."

MAINTAINING LIMITED GUARANTEES

It will cost the manufacturer a considerable sum to make a limited guarantee of performance, as one with experience and judgment must give his most careful attention to each proposition if the guarantee is anything more than perfunctory. And even with the most careful attention given to a detailed guarantee, mistakes will happen, mistakes that will cost considerable money either through overestimating the capabilities of your machines or through underestimating them and thereby losing the order, in which case you should make another charge against the "Cost of Maintaining Limited Guarantees." This, however, is not the greatest objection to guarantees of performance.

The greatest objection in my mind to making guarantees of performance is that your customer too often loses sight of everything except the stated guarantee of performance and does not give due consideration to the machine—that is, whether it is the best for his purpose—whether it will continue to perform that which it was guaranteed to do after having accepted it or whether or not it will be useful in the future, if his work changes.

There is a big advantage in using the broad unlimited guarantee, in addition to its primary object. It will make you improve your machines faster than you otherwise would; it will make your representatives more careful in their statements of performance, and thus create a reputation for your machines, your ability to perform and your honesty, all of which reduce the cost of maintaining selling guarantees.

What are the objections to an unlimited guarantee other than that the purchaser can, if he is so disposed, take advantage of you and return the machine without any just cause? If he wishes to do so, he can question this or that, justly or not—it matters not which—and make you a great deal of trouble and expense, which usually ends by your taking the machine back; however, during a period covering about 10 years and many broad unlimited guarantees, the company with which I am associated has not had such an advantage taken of it except in two cases, and I believe others who have sold those two parties machines on limited guarantees have had fully as much trouble and been to greater expense and then had their machines returned. Therefore, that need not be given serious consideration, as few of your customers are dishonest.

Do not make guarantees with "safe limitations" because you are working in the wrong direction and because it will cost you more to maintain such guarantees. Start on the basis of the right machine for your customer, and then make your guarantee broad and short and without limitations, such as: "We guarantee this machine satisfactory to you."

The Discussion of Guarantees

PRESIDENT BULLARD: It has always seemed to me that when guarantees are all totaled up and boiled down they amount to the fact that we guarantee satisfaction. I know that some concerns have been putting machines in on trial. Every machine tool is on trial, and if it is found unsatisfactory it would be for the interest of the seller that it should come out. Mr. Gridley's suggestion that we make our guarantees broad seems to be a desirable one, for there must be perfect satisfaction and perfect harmony between buyer and seller. So, personally, I should like to see us all make broad guarantees; I believe we would all be benefited by it.

JAMES N. HEALD, Heald Machine Company: The problem of guarantees comes home to the grinding machine people even more directly and strongly than to other lines of industry. It can be safely asserted that where one man will buy a grinding machine without having to be shown, and having it demonstrated to him, there are 10 if not 50 who would buy an upright drill or a planer or a lathe with the confident feeling that their men will get out of that machine what there is in it. They do not worry whether their men will drill all the holes that an upright drill is capable of, even though a man is not sent along to see that it will do its full work. Now, the matter of limits in guarantees is a difficult one because of the varying conditions in different factories. We have sold grinding machines in one of the factories in a leading Michigan city, a finely organized shop. They get their boring very accurate, and grind 50 or 60 cylinders in a day. In their shop they have fine boring apparatus. Their holes do not run off sidewise, and all the details necessary to a perfect job are carefully looked after. I foolishly advertised in a certain way that we were getting 50 holes from a certain factory. Other shops came back at me and said, "Why aren't we getting 50 holes in our shop?" Shall I tell them that their methods are poor, their foreman is slack, their equipment is out of condition, and so they could not possibly equal the performance of the other factory? Not much. Failure to send a machine that meets the conditions required in a certain factory may be accidental and unintentional—of course, in some instances—but when the representative of the machine tool builder knows just what his machine has got to do, and then deliberately sends a machine knowing that it will not answer what is required of it or suit the customer exactly, but hoping that he won't be stiff enough about it to send it back, it makes me feel that we want to reach a higher standard of ethics.

Here is another point: We should know exactly what the customer is going to do. This story may sound to you apocryphal, but I hope not. Some years ago a representative of a grinding machine company went into a man's office and talked grinding machines. The buyer said, "Will your machine grind very accurately?" "Yes; what are your limits?" "Oh, we have got to have the exact size, our work has got to be exact." "Well, how many thousandths of an inch?" "Well, I will show you," said the buyer, and he opened a drawer of his desk and brought out a pair of old-fashioned spring calipers, and said, "We have to set it so that these calipers will just fit." Now, the calipers would spring ten to fifteen thousandths of an inch. That was his understanding of accuracy. A neighbor of ours had a proposition of grinding one time, the drawings for which called for extreme accuracy, perhaps half a thousandth, and between shoulders a couple of thousandths. They wanted a guarantee as to output. The guarantee was made. But how about the same work in their own factory? The crankshafts made in their own factory varied a couple of thousandths in the diameter and ten or fifteen thousandths in the length of the shoulders, and when this grinding company's estimate was put up against what they were doing it did not work out at all, because they were bidding on a job of extreme accuracy while the people were satisfied that the product made within their own factory was within far broader limits. Therefore, my contention is that in studying the matter of guarantees, limitations, etc., we have got to get down close to the people we want to sell to and find out how the work will come to our machine and what the limits of variation are before we can make an intelligent guarantee that we can stand up behind and safely give the customer satisfaction.

C. H. NORTON, Norton Grinding Company, Worcester, Mass.: In the old days when we did not make any guarantees everybody bought a machine tool on his own judgment and the reputation of the seller. Those were great days. All you had to do was to put conscientious work into your machine and sell it to a satisfied customer. But we must remember also that in those days production was small and our workmen did not do all day, as we used to say, enough to put in your vest pocket. We had to do that way to make a nice machine. It was not essential that a large quantity of work be turned out. It was not then considered that a machine should be so constructed as to make a workman do something whether he wanted to or not, as one gentleman remarked to me. We have to do that today, and there is where the guarantees come in. This matter of limitation of guarantees, I feel, is one that must be considered, as Mr. Heald said, in every case in connection with knowledge on our part as to the buyer's conditions and what he desires the machine to do. We must know what his idea of large production is; what his idea of accuracy is, and that all leads to education on both sides. How can you carry out the guarantee unless you go there and do it? A pretty good way to guarantee anything is to say that you will go there and do the trick, isn't it?

If your customer says, "Oh, your expert man can do it, but our men cannot," your reply is that your expert man is simply made of flesh and blood; he was born in the same world and probably about the same time as the other men whom the manufacturer proposes to put to work on the machine, and he has no greater qualifications for carrying out that limit than any other man has. But the idea is to go there and do it. You learn a great deal about your own machine, you learn its limitations and imperfections. You are taught to improve upon it, and you do not lose anything by making a guarantee and carrying it out. You are the gainer as much as your customer, and both are educated.

GUARANTEES ON FOREIGN SALES

D. C. ALEXANDER, JR., of the Department of Commerce and Labor: It seems to me that the discussion has been largely from the viewpoint of domestic trade. I have been interested for the last two or three years in the question of export trade. On our machine tools I know that the guarantees that are given to domestic buyers are usually very good. It is a common thing to sell machine tools in this country, as you say in your advertisements, on 30 days' trial. But I would like to ask if it is customary among the concerns represented here to sell their machines for export with any sort of guarantee or with any sort of period for trial? As far as I have been able to find out, it is not customary. I have visited a great many different machine shops abroad and often asked the people using American machines, "Did you buy this machine under any sort of guarantee that it would perform any special service?" and nine times out of ten the answer has been, no, that they got no guarantee at all, that they had simply selected the machine from a picture in a catalogue, and that the person they bought it of told them it was a planer, or lathe, or whatever it might be, and that was about all he had told them. I found in the majority of cases that the American machines were not being worked up to their capacity, although in a few instances they were worked beyond their capacity.

I think it would be a good idea to ask your agents, when they are sending in orders for export, to try to get data as to the exact conditions under which the machine is to act and the kind of work it will be expected to do, so that you may have the opportunity to advise as to the type and size of machine. I recall an instance of a railroad shop in Australia where a 12-in. American lathe had been ordered for turning up axles with a very heavy cut. The machine was from one of our best manufacturers. It came out with a cone for a 2-in. belt. When installed in this shop it was found that with the 2-in. belt it did not cut quite as fast as desired, so a new cone pulley was made for it to take a 4-in. belt. That 12-in. lathe was then run for all it was worth, and the lathe was nearly pulling itself loose from the flooring, and the people that had bought it were saying, "There is an instance of an American machine that is too light for the work." So I asked the manufacturer, "Did you let the agents know for what purpose you were buying the machine?" He said, "Yes, I told them I was buying a machine to turn up axles, and they asked me what were the maximum diameters, and I told them not over 6 in., so they told me a 12-in. machine would be quite big enough."

I have seen many times a high speed American machine standing beside the British machine, the British machine turning out say 12 pieces an hour, and the high speed American machine turning out 15 pieces in the same time, and they would say, "That American machine is not worth the difference in price paid for it. Two British will turn out more than the American machine will do." In a great many instances I have said to such men, "Speed that American machine up." They would reply, "We are afraid of breaking it." I would tell them, "I have seen it running at double that speed without any harm resulting." They have told me they would try it, and they have done so and at the end of a week have told me they were getting surprising results.

It seems to me that, while the guarantee might not be always definite, you might furnish specifications with your machine saying that it will remove a certain number of cubic inches at half speed and at full speed so much more; give them an idea of what it will do; cite cases where the machine is in use for such and such purposes. For example, if the machine has been used in a railroad shop, and a railroad shop is contemplating its purchase, you can let them know what the machine has done in other railroad shops along the same line, citing shops where it is turning out a given number of pieces per hour, and perhaps furnish a photograph of the machine in actual operation, showing what the amount of work is that it will do. In this way you will often find that the people will not only get results that will satisfy them but they will come back to you for duplicates of the machine, and they will be the means of your selling other machines in the same locality, because they will tell their friends that American machines can be depended upon as heavy duty machines.

MR. GRIDLEY: In regard to foreign business I will say that we make specific guarantees for few machines.

MR. NORTON: All of ours are guaranteed, but we have to send some one to work out the guarantee. You cannot guarantee anything and allow the other fellow to work it out for you, I assure you, no matter what your tool is.

F. W. HOEFER, Hoefer Mfg. Company, Freeport, Ill.: We cater a great deal to special machines in connection with our regular line. We find that there are two points of view, one from the manufacturing end and the other from the purchaser. We make a small auxiliary drilling head attached to any ordinary drill press, no matter what make it is. I happened to sell an order to a concern down in Indiana. The buyer said: "We have got very hard material to drill and I want you to guarantee that head will stand up; will you do that?" I said, "I will make that head so that it will break any drill that you put into it." Said he: "All right. I will give you the order." What does he do but go to an outlay of $32 to put in a new counter-shaft and speed it up so high that it did break $9.50 worth of his drills, and he wants to send that head back.

Motor Drive Features on Machine Tools

Edson R. Norris, director of manufacturing operations, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., took up the question of motor drive in his paper entitled "Automatic Features on Machine Tools, to What Extent Are They Commercially Profitable?" He said, in part:

The demand for motor-driven tools, especially by the larger manufacturers, is increasing, as the value of the motor drive is becoming more fully recognized; but some tool builders do not seem to realize this fact, or to take it into account in their designs. Machine tools so designed that the only possible way to motor drive them is by ceiling mounting and belting down to them, or by placing the motors on the floor some distance from the tools, are very unsatisfactory to those desiring such application, and it is safe to assume that this type would not be considered if it were possible to find other machine tools better arranged to do the work.

While this fault can be found with some machine tools of recent design, most of them have been on the market for years, and in place of making them more suitable for motor application, some builders have designed new lines of machines which are satisfactory as far as motor application is concerned, but which cost considerably more to install on account of the greater number of parts or attachments and higher power features. While these new types of machines have a broad field of usefulness and are profitable on certain classes of work they do not entirely replace the old type; it is obvious, therefore, that users whose policy it is to motor drive must either belt drive some of their equipment or else do on expensive tools work which could be done as economically on cheaper and simpler tools.

ADAPTING A MACHINE TO MOTOR DRIVE

As showing what may be accomplished by a combined effort on the part of the machine tool builder and user, an instance may be given of a small hand milling machine, which has been arranged for adjustable speed motor drive in a very satisfactory manner by widening the column of the standard machine to receive the motor, and driving direct to the spindle, by means of a sprocket chain. Ventilation is secured through suitable openings in the column, and a semi-dust proof condition is obtained by covering these openings with a fine mesh wire screen. Saving in operating time and changes in speed are obtained by the use of a starting and speed adjusting rheostat so placed on the side of the machine that the operator does not have to change his position to start, change the speeds or stop the machine.

This application requires no extra floor space and makes a self-contained portable unit which can be readily shifted from one location to another, making the tool available and desirable to those wishing motor application. In making this change the tool builder was put to some additional expense and the purchaser charged accordingly for the first machines, but on later purchases the price was about the same as the regular charge for the standard cone type.

This is uncommon, however, as machines sold for motor drive generally cost more, regardless of the fact that the full value of the parts not required seems more than those added for motor application.

MOTOR DRIVE FOR PLANERS

A few years ago it was not considered advantageous to motor drive planers, but now the adjustable speed reversing motor drive for planers is generally accepted as a decided

improvement over the usual method of belt drive. This is merely mentioned to call attention to the possibility, by the use of the adjustable speed motor, of eliminating some of the mechanical speed changing features of other equally important machine tools and, in so doing, of obtaining a more satisfactory range of speeds.

On some types of machines the speed changing features can be omitted without altering the designs to any great extent, but this is not true in all cases, clearly showing that adjustable speed drive was not considered when designing them.

In conclusion, it may be said that on commercial lines of work the operations and methods are so planned that the help are only required to perform a single operation and can therefore be graded accordingly. It is consequently not good policy to use highly improved machine tools capable of doing a wider range of work than the operators are called upon to do. The machines should, however, be equipped with any automatic features which will decrease the amount of skill necessary to operate them or which will reduce the cost of performing the required operations.

Discussion of Motor Drives

C. H. NORTON, Norton Grinding Company: If machine tool builders are going to furnish motor-driven machine tools for variable speed motors and also the same tools with mechanical speed changes, which they must do, that makes them all cost more, because all motors are not variable speed. While one customer would want variable speed motor drive, the next customer does not. You have to have your mechanical changes for him. One reason why motor application costs more is that there are so many different requirements dependent upon the current they will use. Some machines have a possibility of variable speed motors and others have not. But we must have the various kinds and they must cost more because of their variety. Another thing, in connection with grinding machinery it has been difficult to get electrical people to realize that grinding machines must rotate without vibration, and motors do vibrate. Occasionally we have been successful in getting some motor appliances in dynamic balance so that they do not vibrate, but it is not a common thing, and they charge us more for doing it and they insist on our putting the motors on for them, and then they penalize us because we have done so. Now I think we ought to get together and realize that in order to have a good machine tool you cannot have vibration. If you are going to have a motor the motor must not vibrate.

MR. NORRIS: I have looked up a great many designs. I know nearly all that are made, and I find in some cases the mechanical speed changing device can be entirely eliminated without changing the design of the machine. In several cases we have taken away the operating mechanism, changed the gears and applied a speed motor, and it has in no way affected the first design of the machine—just an elimination, that is all. I have also found that in some cases it was impossible to eliminate or take away any of the changed gears without affecting the design of the machine. In other words, the operation of the machine depends upon the running of these trains of gears to perform its functions. As to grinding machines, I fully appreciate that the motors are not in balance at variable speeds and that the grinding would be affected accordingly, but nevertheless we are coming to the motor driving of grinding machines and it is a very desirable machine to drive that way.

Development of Cutting Tools

B. F. Waterman, Brown & Sharpe Mfg. Company, Providence, R. I., read a very instructive paper, copiously illustrated by lantern slides, on "The Development of Cutting Tools," in which he traced the various types from their earliest known design through their evolution to present practice.

Heat Treatment of Steel

The Thursday morning session was given up to discussions of the heat treatment of steel, and the papers were listened to with great interest, for much information of practical value was given. On the subject, "The Use of Heat-Treated Gears in Machine Tools," Andrew C. Gleason, Gleason Works, Rochester, N. Y., spoke from the standpoint of the machine tool manufacturer, and J. Heber Parker, metallurgist, Carpenter Steel Company, Reading, Pa., from the standpoint of the material manufacturer. J. G. Weiss, works manager of the Hyatt Roller Bearing Company, Newark, N. J., made an address on "Carbonizing and Heat Treating of Shafting—Methods and Materials Used."

Meeting of Machine Tool Dealers

Machinery Branch of National Dealers' Association Discusses Trade Questions

The third annual meeting of the machinery section of the National Supply and Machinery Dealers' Association was held in the Hotel Astor, New York, October 23. The programme called for a session on the following day, but it was found to be unnecessary. The attendance was fair. The annual convention and election of officers of the association is held in the spring.

The opening session was called to order by President Charles S. Farquhar, Chandler & Farquhar Company, Boston, who introduced Henry Prentiss, Prentiss Tool & Supply Company, New York. Mr. Prentiss, who is first vice-president of the association and in charge of its machinery interests, acted as chairman and addressed the members, in part, as follows:

Address of Vice-President Prentiss

"A year has elapsed since we last met here to consider matters of interest to us individually and as an association. While we have had trying and perplexing experiences since then, yet, as a whole, we look back upon the year with satisfaction, holding in pleasant recollection all that has been good, which has been in large measure, and forgetting the unpleasant, unless the remembrance will safeguard us from another similar experience. This philosophy is helpful in giving us the poise, confidence and resourcefulness which fit us to realize a prosperous future. Let us dwell upon the good features of our business activities and the many things we should be thankful for, which promote a receptive condition for larger attainments.

"I wish to urge upon your attention, as unwise procedure, the effort to get business by disparaging your competitors' machines. As a rule this proves a boomerang to the one who practices it. It usually follows that a prospective buyer reaches the conclusion that the competing machine must possess merit, otherwise the competition would not be feared; this leads to investigation which, in many instances, discredits the statements made and in consequence the business is lost.

"It is too early to estimate, with any degree of accuracy, the effect of the new tariff, although it seems to be the general impression that this will not be a disturbing factor to the dealer. What we will lose in the new competition which we will have to meet will, no doubt, be more than equalized by the opportunity of marketing foreign tools which will not, in any way, be injurious to the interests of the manufacturers whom we represent. Because we face new conditions growing out of this change in Government policy is no reason why fear should control our thought and actions, thus weakening our endeavors in building up and rounding out our individual business fabrics. We should look for and expect better conditions because of this change and work persistently and hopefully to realize our expectations, instead of thinking and talking hard times and by our slackening and discouraged efforts help to bring this to pass. A wise optimism is essential to enduring success in every department of human endeavor."

The report of Secretary-Treasurer Thomas A. Fernley showed the affairs of the association to be in a satisfactory condition.

For Loyalty to American Manufacturers

In the course of a discussion as to the effect of tariff changes on the business of the dealers, the opinion was expressed generally that no great influx of foreign machinery was probable and in any event it was the duty of the dealers to remain loyal to American manufacturers. Satisfaction was expressed over the failure of the original proposal to place machine tools on the free list. The cut in the duty from 30 per cent. to 15 per cent., it was asserted, would not hurt business generally.

At the second session the report of the Machinery Committee was submitted by the chairman, O. P. Meckel, Baird Machinery Company, Pittsburgh, Pa. This committee consists of E. R. Motch, Motch & Merryweather Machinery Company, Cleveland, Ohio; W. E. Shipley, W. E. Shipley Machinery Company, Philadelphia; R. J.

Lynd, Chandler & Farquhar Company, Boston; J. W. Wright, Colcord-Wright Machinery & Supply Company, St. Louis, Mo.; Anton Vonnegut, Vonnegut Machinery Company, Indianapolis, Ind., and Mr. Meckel.

The dealers decided that it does not pay them to send out salesmen on strictly missionary trips. As to supplying salesmen with automobiles to cover their territory, the decision was reached that the wisdom of doing so depends largely on circumstances and on the salesmen themselves.

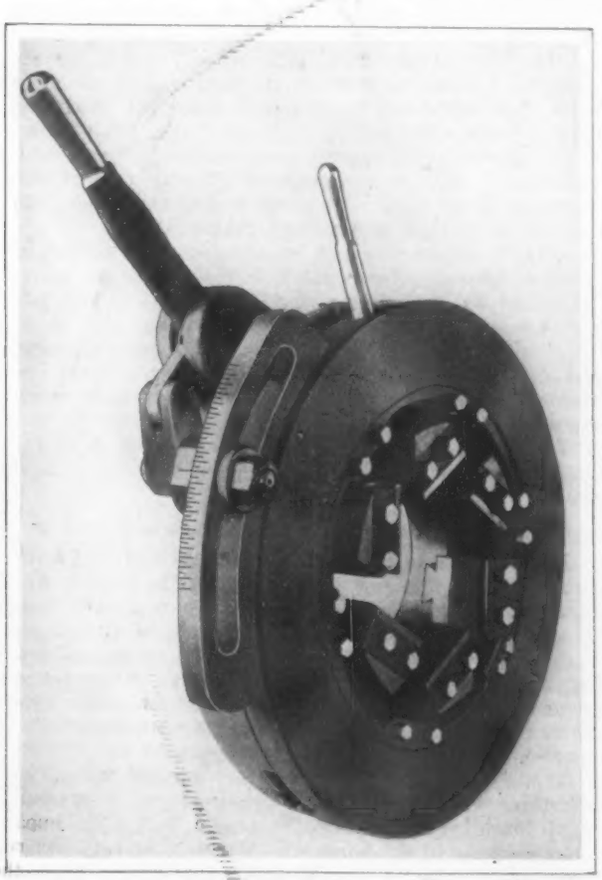
Other Questions of Trade Importance Considered

The question of the extent to which manufacturers should replace parts found defective after a machine has been in use more than a year after its sale was taken up, and the consensus of opinion was that they are not called upon to do so, except in exceptional cases. A vote on the percentage of expense of selling machinery was taken and the result showed but little change from the average of previous years, although the members pointed out that greater efforts now have to be put forth to keep selling costs down. The meeting favored quality arguments in selling machinery, and the need of thorough knowledge by salesmen of any line handled was emphasized. In regard to uniform terms of sale where title is not withheld, it was agreed that 30 days net, with no cash discount, was generally observed by dealers.

The Pacific coast was represented by Charles Stallman, Pacific Tool & Supply Company, San Francisco, Cal., and John O. Harron, Harron, Rickard & McCone, San Francisco, second vice-president of the association.

A Six-Chaser Stationary Pipe Die Head

A new type of die head has been placed on the market by the Landis Machine Company, Waynesboro, Pa., applicable to certain pipe machines of the rotating type. A general idea of its operation can be obtained from the accompanying engraving, and as will be noticed, the head is composed of four major parts: the body which carries the chaser slides; the slides themselves; the operating ring, which imparts the oscillatory motion of the handle to the chaser slide, thus giving the chaser a universal radial movement toward and away from the center, and the chasers.



A Stationary Pipe Die Head with Six Chasers for Cutting a Large Number of Threads Simultaneously

According to C. F. Meyer, of the company, its life is ten to twenty times that of the ordinary hobbed type die. Moreover, the line contact of the chasers with the work reduces the friction to a minimum and allows, he says, much higher cutting speeds. In commenting further, Mr. Meyer offers the following explanation: This increase in speed is augmented by the flexible rake feature, which makes it possible to obtain good cutting conditions and successfully thread all grades of pipe, whether iron, steel, brass or copper. Since the lengths of thread on the standard sizes of pipe are fixed, a die that requires grinding in the throat is of little or no value, as a few grindings will cause the length of thread to fall below the standard. This objection is also eliminated with the Landis die, since the cutting contour is always the same, due to the fact that the chasers are ground on their inner ends and never on the bevel surfaces which form the throat.

At a recent test made in the plant of a large eastern pipe mill a circumferential cutting speed of 40 ft. per min. was maintained. This means that the various sizes of pipe were rotated at speeds ranging from 227 r.p.m. for pipe ⅜ in. in diameter to 64 r.p.m. for 2-in. pipe.

As one set of dies covers the entire range and all sizes of standard pipe where the pitch is the same, it is unnecessary to remove the chasers from their holders, except for grinding purposes. The removal is accomplished by slackening the two chaser clamping screws on each holder just enough to allow the chasers to be slipped from their seats. They are set to the proper position by bringing the cutting edges flush with the flat surfaces on the chaser slide, provided for that purpose. A steel scale or straight edge will simplify this operation. Special mention should be made of the mill chaser clamps which overhang the chasers and protect them against split or twisted pipe. The chasers are hardened throughout their entire length and never require annealing, hobbing or retempering. They are also interchangeable, which enables one or more of a set to be replaced without renewing the entire die.

Receivers for Standard Roller Bearing Company

The Standard Roller Bearing Company, Philadelphia, Pa., one of the largest of its kind in the country, was placed in the hands of Robert S. Woodward, Jr., and S. Laurence Bodine as receivers October 22. The company manufactures ball bearings, roller bearings and steel balls, employing more than 1000 men. It is capitalized at $8,000,000.

Action was taken by the First National Bank of Philadelphia, a creditor to the extent of $3000, on the ground that the company was unable to pay the interest or principal on its floating indebtedness, and in consequence its assets were in jeopardy of attack by creditors. According to the bill of complaint filed the assets of the company are in excess of its liabilities and, if properly conserved under receivership proceedings, the creditors will be paid in full and a substantial residue left for the stockholders. Fear was entertained that creditors would institute suits, attachment proceedings, etc., and so tie up the company that a great loss would be suffered. Under the court's direction the receivers will take entire charge of affairs and hold the assets until they are ordered distributed.

Mr. Woodward, a receiver, who is also president of the company, has issued a circular stating that the operation of the factory will be continued in the manufacture of steel balls, ball bearings, roller bearings and Rudge-Whitworth wire wheels for automobiles. Orders will be received and executed as heretofore. The existing organization will be preserved and the same high quality of product maintained.

The Bristol Company, Waterbury, Conn., has taken over the business of the Goodwin Hollow Set Screw Company, and will manufacture the Goodwin hollow safety set screw with dove-tailed slots. Shipments are already being made from the main plant of the Bristol Company, which is now standardizing its sizes and improving certain interior dimensions of the heads of the Goodwin set screw.

A Heavy 30-in. Rapid Production Lathe

For very heavy roughing work, such as is required in steel and forge shops, the Niles-Bement-Pond Company has recently developed a 30-in. rapid production lathe at its Pond Works. The tool is of massive, powerful construction and steel gears are used throughout. An idea of the strength and power of the lathe can be gained from the fact that a 35-hp. motor, which will deliver about 26,000 lb. pressure to the tool at a speed of 50 ft. per min. is used for driving. The net weight of the machine when built with a bed 19 ft. long is 25,600 lb., including the motor.

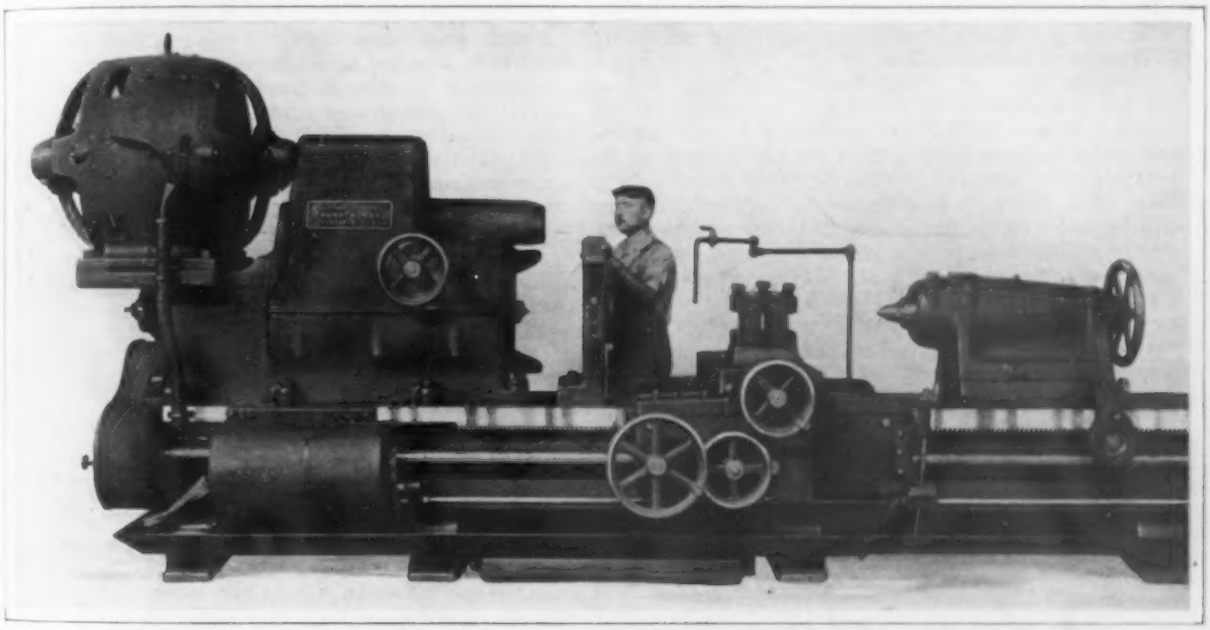
The bed is wide and deep, with wide, flat tracks that are tied together at short intervals by ties of heavy box section. The bed is mounted on short legs in a deep steel pan, which entirely surrounds the bed and extends beyond the sides a sufficient distance to prevent the cutting fluid from dripping on the floor. The pan is also mounted on the short legs, sufficient space being thus provided underneath for a wheeled tank to be used at the head end for collecting the lubricant.

A direct-connected adjustable-speed motor, mounted on the headstock drives the spindle through gearing, the motor pinion and the gear with which it meshes having herring-bone teeth. A convenient lever enables two mechanical changes of speed to be made in the headstock. The lower speeds of the face plate are obtained by a pinion driving the face plate gear. Emphasis is laid upon the fact that the design eliminates any tendency of the resistance of the tool or of the power applied to the pinion to lift the main spindle in its bearing, and the bearing caps are relieved of the upward thrust due to the cuts. The higher speeds are secured by driving directly through the face plate spindle, thus obviating the necessity of running the face plate pinion at an excessively high speed. The gearing in the headstock, in conjunction with the adjustable-speed motor, provides 40 face plate speeds, ranging from 13 to 174 r.p.m. A handle on the carriage enables the face plate to be started, stopped or reversed or any of the wide range of speeds to be obtained without it being necessary for the operator to leave his position at the carriage. Large hardened steel and bronze washers take the end thrust of the main spindle. The face plate is of steel and has radially adjustable drivers. All of the rotating shafts in the headstock are mounted in bronze lined, self-oiling bearings with large oil wells. The bearings and the gears are entirely inclosed and furnished with a continuous supply of oil from a tank in the headstock, which is kept filled by a geared pump. This pump draws the supply of lubricant from another tank in the bed, into which the surplus oil drains and is filtered before being used a second time.

Ribbed box construction is employed for the apron which has supports for the feed gear shaft at both ends, as well as bronze bushed bearings for all the rotating shafts. The center rest is of heavy, rigid construction and has three adjustable jaws with large wearing surfaces. The tool carriage has a bearing on the bed throughout its entire length, both front and back, and is gibbed underneath the track, both inside and outside. The edges of the carriage are raised and drains are provided to prevent the lubricant from running on the floor. The drainage surface is below the tool slide guides, all of which are protected from chips and water. It is pointed out that the length of the wide bridge upon which the tool slide travels is so great that the sliding surface on the carriage is not uncovered, even when the largest diameters are being turned. Four heavy bolts and a cross piece secure the tool block or carrier to the top of the slide. There are two open side slots and one closed central slot in the tool block, each of which is large enough to receive tools measuring 1¼ x 2½ in. and has a hardened serrated plate and three clamping screws.

The tailstock, which is massive and rigid, is nevertheless readily moved by gearing engaging the steel feed rack. There is a graduated setover for turning small tapers and the tailstock can be rigidly clamped to the bed by four large bolts. As a further precaution against slipping under heavy loads, a tail brace is provided which engages with a rack in the bed.

A geared pump, located at the headstock, provides a large stream of cutting lubricant. This is conducted to the tool carriage by telescopic piping mounted on the back of the bed, and after being used, the lubricant returns from the tool carriage to a tank at the headstock end of the lathe.



A Recently Developed 30-In. Lathe Designed Especially for Taking Very Heavy Roughing Cuts at High Speeds

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The Transue & Williams Company, Alliance, Ohio, has purchased all of the assets of the Davies-Bach Mfg. Company, which was organized to produce steel stampings of every description, and recently erected a modern plant in Alliance. The Transue & Williams Company will operate this plant, which is to be known as its steel stamping department. It expects to enlarge the plant materially and to solicit general steel stamping business. It further expects to add from 60 to 80 per cent. to its present drop forge plant, and is contracting for new buildings and additional machinery, such as steam drop hammers, milling machines, planers, lathes, shapers, trimming presses, general forging machinery and all such tools as go with a first class forge plant. The Transue & Williams Company has been operating in Alliance for 18 years and has run continuously day and night during that time. When the new equipment is in place, it will employ about 200 additional men.

Extras, the Reason and Necessity Therefor*

A Discussion of the Conditions in the Steel Trade Which Have Caused the Adoption of Extra Prices for Special Sizes or Qualities

BY J. LEONARD REPLOGLE†

In their primitive development, iron and steel were limited to few and simple uses; now, however, they are required for manifold and complex purposes. This evolution has naturally created a demand for products of greater refinement. Material suitable for one purpose may be wholly inadequate for another. The contractor who buys bars for the construction of a picket fence, concrete reinforcement, or uses of this nature, is not justified in demanding the refinements and paying the extra price necessarily demanded of the buyer who uses his bars for the manufacture of automobile axles or other forgings constantly subjected to severe alternating stresses. In the manufacture of a steel bar entirely satisfactory for the former purposes, high yield from ingot and minimum costs are obtained, while for the latter the reverse is true. The tank or car builder will experience little, if any, difficulty with steel plates which would be manifestly unsafe for locomotive or marine boilers.

Wire suitable for a field fence is absolutely unfitted for use in a rope for an elevator or an inclined railway service. Master Car Builders' standard axles, well adapted for steam railroad service, have proved unequal to the severe service conditions of the Interborough subways in New York where, in addition to the regular alternating tension and compression strains, the axle is almost constantly subjected to terrific torsional stresses due to the sudden starting and stopping of the heavy trains—the motor being keyseated direct to the axle. The plate consumer who specifies thin gauges or circles and special sketch plates which necessitate low mill tonnage and heavy cutting losses should pay a higher price per pound than the consumer whose specifications call for rectangular plates from which a very much higher yield from the ingot and greater output are possible. Thus is has developed that the manufacturer is forced to charge an extra in one case while selling at a minimum price in the other.

Extras Discourage Unreasonable Specifications

Extras are, or should be, a legitimate increase over the base price of steel products and should represent only the increased cost over what are regarded as standard sizes, quality or grades of our various products. Mark Twain said, "'Tis a difference of opinion that makes horse races" and "a difference of opinion" also frequently causes extras. Even with uniform conditions of service we have the human element to consider, and the wide diversity of opinions of engineers, architects and consumers as to the proper grade of steel for a particular purpose often prevents the standardization of products necessary to permit their manufacture at minimum costs.

As before stated, however, service conditions are not uniform and certain consumers are justified in paying extras for rigid specifications, which mean low yield from ingot, reduced output, constant expert supervision throughout the various processes of manufacture, heavy rejections and the resultant increased costs, where others use with safety and satisfaction material which can be produced at a lower cost. Without extras the unreasonable buyer (happily in the minority) would insist upon unnecessary discards, refinements and restrictions which would increase costs to such an extent as to heavily penalize every buyer of steel.

Under extreme conditions, the law of supply and demand also influences extras. The great trunk lines of the North, with their low temperatures, heavy traffic, and more severe service conditions, demand better rails than is necessary on certain smaller lines in the South, with their warmer climate and comparatively light service, where a good Bessemer rail would give satisfactory results. There are many millions invested in the Bessemer industry of the country, which has been showing a steady decline since 1906, and it is questionable whether the buyer, whose demands for open-hearth steel compel enormous capital investments to take care of his requirements, is entitled to the same price as is the one who can use Bessemer, of which there is normally an excess capacity. There are many purposes for which buyers demand open-hearth steel today for which Bessemer would be as well adapted and, as an economic proposition, should be used.

Extras Should Represent Increased Cost

Quite naturally, the question is raised as to what should be sold at the base price; and, generally speaking, we would say, that which represents the maximum yield at the minimum cost. More specifically, it should embrace all those materials intended for the commoner uses which, subject to standard specifications of liberal range, can be produced by good average mill practice with the least loss of product and expenditure of labor and money. Extras proportional to the increased cost should be added whenever materials of greater refinement are required. Such cases are numerous. For ordinary purposes considerable latitude in the chemistry of steel is admissible. For others, however, it may be necessary to restrict the carbon to narrow limits or require very low phosphorus or sulphur, high silicon or an unusual manganese content. This naturally requires special selection of raw materials, to say nothing of the likelihood of "off-grade" heats that are difficult if not actually impossible to market. It not infrequently means entire loss of product.

Size of section has also a very direct effect upon costs. For every class of mill there is a range of sizes that yield the maximum tonnage. Lower production follows a decrease in size, thereby adding to the costs because of the lower tonnage over which to distribute fixed mill charges and the higher rate per ton paid for labor. Heavier sections may even increase costs. This is true of the large size forging blooms and the larger sizes of structural shapes of which, because of the limited refining influence of rolling and the bigger units involved, there is a greater chance for rejections due to surface or other imperfections. One consumer can allow considerable variation in length, while another must have material cut to exact dimensions. One is not concerned as to the finish; another must have a highly planished surface. One can use material that is only approximately close to size or section; another must have it absolutely accurate. One is troubled but little if there are a few seams or pipes; while another must have perfectly sound stock, to insure which it is necessary to make a heavy ingot discard and a careful selection of all product both before and after rolling.

All of these features tend to increase costs for which the manufacturer must secure remuneration from some source. Shall he distribute these higher costs over all his products, adding thereby to his price to all consumers, or shall he differentiate between those of an ordinary and those of a special nature, establishing extras to cover the latter? Manifestly it is unfair that the purchaser of an ordinary tank should share in the expense of a marine boiler, or that the farmer should be penalized on his implements because of the costlier material entering into the manufacture of the automobile. It would seem, therefore, that equity demands a series of extras to cover all deviations from standard practice as they may relate to analysis, size, yield from ingot, mill output or any other factors that tend to increase costs.

Extras Should Be Uniform Throughout the Trade

These extras, however, should be uniform throughout the trade and should be just and equitable, representing

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only what will safely cover the enhanced costs, not of every manufacturer but rather of those whose operations are economic in the sense that they conform to the average of modern mill practice. There are unquestionably many inequalities in the schedule of extras now in common use and there are likewise some features which do not now, but which should, carry extras. A readjustment or compilation of extras should be made on an equitable basis and only after a thorough study. I believe that a fair schedule of extras meets with the indorsement of the manufacturer and the consumer as well; as without standard extras trade quotations would be of little value. The manufacturer who had quoted the lowest base price per pound might, by his higher extras, be the highest bidder.

As we have shown that there is reason and necessity for extras, they should be rigidly adhered to regardless of the base prices quoted. I think we all agree that with the possible exception of our present weak optional contract system, there is no more unreasonable practice in the trade than the cutting or elimination of standard extras which must sooner or later result in a deterioration in the quality of material for the more important uses and certainly tends to the general demoralization of the industry.

Discussion

Col. Henry P. Bope's Views

Henry P. Bope, vice-president and general manager of sales, Carnegie Steel Company, said:

It is difficult to add anything to the presentation of this subject as made by Mr. Replogle. He has covered the reason and the necessity, and what is left is to say something as to the method of determining what extras should be added to the various base prices.

Extras Not Arbitrary

It does not always seem apparent to the buyer, in discussions of this subject, that extras are not merely arbitrary advances over the base, but have been made in line with actual costs of manufacture of the item on which an extra is charged. This may be due to the fact that some of the original cards were made in this manner. But recent cards, notably those on bars and hoops, have been scientifically arranged, based on costs of manufacture taken over a considerable period of time and under conditions of both high and low production.

The designing and manufacture of a large number of special sections in the past few years, most of which are made in bar mills, and are classified as bar mill products, have also made it necessary to arrange carefully a card of extras. Then there is the overlapping of certain gauges and thicknesses in plates and sheets, and in wire and bars, which would have made for confusion had not the card of extras covered the situation. With the growth of demand and the increase in the number of specialties governed by extras, the necessity becomes greater for a better understanding as to extras. Improvement in manufacture or other causes may add to or decrease the cost of manufacture. Concerning these changes, the buyer should be kept fully informed and should either be asked to pay for the increased costs or be given the benefit of the decrease. This is only fair dealing, the basis of all relationship between buyer and seller.

Extras Should Be Maintained

I am quite in accord with Mr. Replogle in the necessity for a maintenance of extras, once established. A base price may readily be changed as conditions of supply and demand require; but extras once softened or disregarded are very hard to regain. If the assumption be true that extras are simply additional cost of manufacture and contain no element of profit, then a disregard of them is an absolute loss and no reasoning can justify their elimination. There is a legend in the trade that many years ago, when the plate business was in its infancy, makers produced some 10 or 12 different grades, all made from the same heat and the only difference being in the price. Just how much truth there is in that statement I am not prepared to say. Possibly it has had the effect of making buyers look askance at certain cards of extras, but the refinement of the business, the need and the demand for greater care in manufacture, the increase in number and rigidity of specifications and severity of inspection, certainly require a careful classification of product and call for such extra prices as extra costs justify.

Improvements Lower Extras

The improvements in manufacture have done much for the buyer and many of the burdensome extras have been eliminated and a better product for less money is his today than ever before in the history of the trade. I do not mean by this that he is complaining. He is too intelligent not to know the situation as well as the manufacturer, and to his credit the average buyer is willing to pay without question the extra price so long as his competition is on an equal basis.

It all seems to indicate that equality in dealing is all the buyers desire. They do not wish drastic competition any more than the manufacturers. Stability of market is better than low prices, if all are treated with the same measure of fairness—and this applies to extras as well as to base prices.

Opinions of John L. Haines

John L. Haines, assistant to the vice-president, Jones & Laughlin Steel Company, said:

I am glad this subject has been brought under discussion, as it has always seemed to me that there is some misconception as to the real reason and necessity for extras. I believe, in a few instances at least, manufacturers think that extras are a kind of profit, but analysis of the cost will prove this is not so. Frequently, too, the buyer looks upon the extras as a bonus paid the manufacturer.

Mr. Replogle has clearly stated many facts to us and has in an able manner shown that all sizes, qualities and kinds of steel cannot be sold at the same price. Therefore, there was evolved in early times of selling iron a system of selling common sizes at a base price, plus an extra to be added to the base price when the sizes purchased were of a kind to cause extra producing cost to the maker.

Little can be added to what has already been said. When a mill is rolling small sizes, or sizes that even under best practice reduce the output of the mill, a higher cost is at once shown that must be offset by an extra.

Greater Cost of Special Sizes and Qualities

Many special sizes are required today. In fact, sizes are rolled now that not long ago it was thought could not be made on a rolling mill. Some of the special sections cause a heavy roll cost—not only initial cost of rolls, but frequent redressing of rolls. Furthermore, many of these special sections are seldom rolled and it must be remembered that interest on investment counts up the same on investment in rolls as on other mill equipment. When specifications are such as to demand special chemical properties the steel can only be produced at an increased cost.

Mr. Replogle very properly makes special mention of the cost brought about by discard. Some specifications make it necessary to discard a goodly percentage of the ingot and this it can readily be seen adds cost to the product.

In making light sheets there are many types of finish and the extra cost of each must be covered by extras. Then there are coatings that cause extras. Galvanized wire, nails, or sheets must bring an extra over the uncoated products. In tinplate departments steel sheets are covered with tin and it is self-evident that tinplate with a 3-lb. coating must bring a higher price than the lighter coated sheets.

Extras Represent Real Cost

The charge known as an extra is something tangible and represents real cost. In these days of rapid improvement it is essential that tables or cards of extras be carefully and frequently checked. Standard extras are essential to both maker and user. There is a fair uniformity in the standard lists published by the various manufacturers, but in a few instances there are irregularities and some sizes made on different types of mill overlap or intermix. If absolute uniformity can be accomplished it is much to be desired.

I wish to emphasize strongly the importance of maintaining regular extras. Any irregularity is ruinous. The

extra charge only covers extra cost. Any weakening is unbusinesslike and if such a course is followed it ultimately leads to disaster.

Prices may rise and prices may fall. Extras should stand like the Chinese Wall.

Charles R. Robinson's Conclusions

Charles R. Robinson, general manager of sales, Lackawanna Steel Company, said:

Mr. Replogle is to be commended upon the intelligent and comprehensive manner in which he has treated this subject of extras, which is, and properly should be, of vital interest to the entire steel industry.

Extra Pay for Extra Work

Webster's definition of the word is, "Something in addition to what is due; something in addition to the regular charge or compensation—as extra work, extra pay, and the like"; and, in picking out the basic thought from that rather broad definition, I should say that "extra work" is the foundation upon which all additions to the base price in the steel business quite properly rest.

However, like anything really worth while in this world, extras must prove their right to exist, and the fact that they have been operative over practically the entire history of the steel business is sufficient proof that they are fundamentally correct.

Mr. Replogle has the advantage of speaking from both an operating and a commercial standpoint, and, in his paper, he has clearly stated the reasons why steel of certain chemical or physical requirements can, and should, be sold for either a higher or lower net price than a totally different character of steel, both in its manufacture and in the last analysis of its use.

Many Extras Do Not Cover Cost

If we would put the question of extras up to any of our operating departments, I believe we would be told that, in a great many cases, the extras we now print, and are supposed to get, do not compensate the mill for the additional time, labor, care, reduced output, scrap loss, etc., that enter so largely into a strict compliance with many specifications that are presented to us. In the case of our own company, I know that our general superintendent would prefer, at all times, to make ordinary plain steel, both as to quality and section; and, as a matter of fact, estimated costs of operation are based upon what has been, and what can be, done with such tonnages. And, with the present-day necessities of the users—which mean a refinement of specifications both chemically and physically—it is a grave question whether any one of us is paid a corresponding price for the extra work that is entailed.

The base price of various steel commodities has fluctuated within wide ranges in the past, but there has been little change in the extra list, and it may be that, in specific instances, a revision, as mentioned by Mr. Replogle, would be logical; but it is reasonable to suppose that should such a revision take place, the net result would not be downward.

Costs Vary from Mill to Mill

If certain inequalities exist today in the lists of extras issued by the various steel companies (and there is no denying that such is the case), they are undoubtedly due to the individual interpretation of what the extra cost is to meet a specific requirement; and while such an extra might be deemed fair and reasonable by one mill, it might not be so considered by other mills. This troublesome condition can best be met by uniformity in the issuing and application of all extras; and this could be accomplished through the action of a committee, such as Mr. Replogle suggests.

The custom of European steel manufacturers, so far as it pertains to extras, is somewhat different from that of American mills. While they may lose their perspective so far as the base price goes, they look upon their extras with a jealous eye; and, if anything is to be taken out of the sale, it comes off the base price. They issue, also, very complete lists of differentials and extras covering, not only sizes and quality, but quantity differentials as well, so that the buyer can tell just what his material will cost him on any individual specification.

Price Changes Should Affect Only the Base

It is not a hardship for any of us to maintain full extras when our mills are operating to full capacity, but with lean order books, which mean reduced operations, there are those who are not only willing to change the base price, but to attack extras also. In such moments of weakness a precedent is established which it is extremely difficult to shift from our shoulders at some future time.

The quoting of a specific price does not set a precedent; it is simply the mill's tender for that individual order. But this is not true with extras; they represent a trade convention based upon experience. And, if the buyer is once given a concession on extras, he quite naturally expects the same consideration another time, although the base price may be considerably lower.

The interpretation of extras, as applied by the commercial departments of practically all steel companies at times, should not be accepted as a final conclusion as to their necessity or right to exist; although the buyer might readily come to such an unfortunate conclusion when established extras are made a vehicle to secure an attractive tonnage or to tamper with a base price that has been, over a period, fair and reasonable.

I think the fact is admitted by all that salesmen, under commercial stress, at times concede a part (if not the whole) of an extra which it has taken the operating department years to approximate in its costs.

This subject of extras is such a broad and comprehensive one that no paper can do it full justice within reasonable time limits. But it is such a necessary part of the commercial end of the steel business that it calls for the most earnest and intelligent effort upon the part of those whose duty and privilege it is to administer it.

In closing, permit me to say that all of us issue lists of extras, more or less uniform, in which we believe. But, if it can be shown that such lists contain extras that are not fair and just and cannot be defended upon that basis, then we should follow the example of the ancients in their domestic relations, and destroy such weak members, leaving us with a strong and healthy extra list which can and will be respected.

Steel Pans for Lathes and Other Machines

An interesting application of pressed steel work has been developed by the Hydraulic Pressed Steel Company, Cleveland, Ohio. It has arranged to make pressed steel sheets of sizes sufficient to fit lathes, screw machines and other metal-working machinery which at the present time use cast-iron tanks or pans, which naturally are heavier and generally speaking not so strong as the steel pans. Recently one of these steel pans was turned out 10 ft. long and 34 in. wide with sides 5½ in. deep. The company has arranged to make them in proper lengths to fit different machines and in varying widths up to 34 in. In sizes narrower than 34 in. they may have sides deeper than 5½ in., if desired. At present the company is equipped to make pans as short as 3 ft. and as narrow as 16 in. and with sides as shallow as 2½ in. The material is ⅛ in. to ¼ in. thick. The company believes that there will be a wide application of the steel pan in place of the cast-iron construction, now that presses have been built which make it commercially possible to turn out such pans.

What May Be Done with Tubing.—The wide use that can be made of Shelby seamless tubing is admirably brought out in a remarkable bulletin issued by the National Tube Company, comprising chiefly an address made before the United States Naval School of Marine Engineering, Annapolis, Md., by J. H. Nicholson and Emil Holinger. The bulletin, which can undoubtedly be had by addressing the Pittsburgh office of the National Tube Company, gives an interesting array of illustrations indicating the steps in making such articles as a tubular automobile axle with tapered flange or ball ends and such processes as the evolution of a seamless steel cylinder from tubing, making a locomotive bell from tubing, forming a projectile and upsetting, spinning, hydraulic forging and tube bending operations of endless variety. It is doubtful if the information is obtainable in any text book, and it is highly illuminating with regard to unusual articles which can readily be formed out of tubing.

Pig Iron from Titanium Iron Ores

The MacIntyre Iron Company's Extensive Experiments—Their Scope and Importance

Considerable interest has been revived by statements given in *The Iron Age* of October 2 and 9 concerning the deposits of titaniferous magnetite in the Adirondack region of New York State and the possibility of commercially and successfully converting the iron content of those vast deposits into marketable pig iron. The following interesting information has been obtained from E. Shearson, president MacIntyre Iron Company, 71 Broadway, New York City, outlining concisely what has been done and what is planned:

The MacIntyre Iron Company's property is located in the Adirondacks, in Essex County, N. Y., about 50 miles west of Port Henry and about 28 miles north of North Creek, the terminus of the Adirondack Branch of the Delaware & Hudson Railroad. The extent of the ore deposits is so well known that it is probably unnecessary to go into detail in that regard. Several examinations of the property have been made by mining engineers and a unanimity of opinion seems to exist that it is one of the largest deposits, if not the largest, of high grade titaniferous ore in the United States.

Extent of the Ore Deposits

Professor Emmons, state geologist of New York, made a careful examination of this property years ago. An extract from his report will be found in the Department of the Interior's Bureau of Mines Bulletin, No. 64, on "The Titaniferous Iron Ores of the United States, Their Composition and Economic Value." This Bulletin quotes Professor Emmons as stating in his report "that he estimated the ore body of the Sanford Hill to contain 6,830,000 tons at a depth of 2 ft. below the adjoining surface."

The company conducted extensive diamond drilling operations three years ago on the Sanford Hill and Mill Pond deposits and put down in all 32 holes at an average depth of about 200 ft. All of these holes showed practically a continuous body of ore of the same general character. In order to demonstrate the depth of the ore body, four holes were put down to a depth of over 800 ft. and they were still in ore. In addition to the Sanford Hill deposit, there are three other deposits, known as the Iron Mountain, Mill Pond and Cheny deposits.

A magnetic survey of the entire property has indicated that all of these deposits are connected; they lie within a comparatively short distance of each other, and the ores, with the exception of the Cheny deposit, are of the same general character. The Iron Mountain and Mill Pond ores are coarser grained and somewhat richer than the others, and more easily concentrated.

Owing to the topography of the Sanford Hill and Iron Mountain districts, mining operations can, it is estimated, be conducted at a very low cost, using the quarry method. From the level of Lake Sanford to the top of Sanford Hill, the elevation is approximately 700 ft., and the same condition exists at the Iron Mountain.

Composition of the Ore and its Concentrates

A typical analysis is given below of the crude ore taken from Sanford Hill, determined by Prof. P. W. Shimer:

	Per cent.		Per cent.
Iron oxides.... { FeO	37.41	Nickel oxide.....	0.056
{ Fe_2O_3	34.61	Chromium oxide	0.17
Silica	0.89	Vanadium oxide	0.25
Alumina	5.81	Phosphoric anhydride..	0.014
Titanic oxide.....	17.77	Sulphur	0.022
Manganese oxide.....	0.37		
Lime	0.00		100.052
Magnesia	2.41	Total iron	53.36
Alkalies ..... { K_2O	0.04	Phosphorus	0.006
{ Na_2O	0.23		

A typical analysis of the concentrates made from this ore is as follows:

	Per cent.		Per cent.
Silica	2.26	Sulphur	0.104
Iron oxides.... { FeO	33.19	Carbonic anhydride....	0.36
{ Fe_2O_3	43.51	Carbonaceous matter...	0.17
Alumina	4.52	Combined water.....	1.45
Titanic oxide	12.34		
Manganese oxide	0.27		100.421
Vanadic oxide	0.47	Phosphorus	0.003
Chromium oxide.....	0.19	Chromium	0.134
Lime	0.10	Vanadium	0.260
Magnesia	1.48	Manganese	0.209
Alkalies	trace	Titanium	7.40
Phosphoric anhydride..	0.007	Metallic iron.....	56.29

As a result of many other concentration tests by slightly finer grinding, the metallic content averages 58 per cent. and over.

Scope of the Experiments to Be Made

For the purpose of making a practical blast furnace test the MacIntyre Iron Company is now engaged in mining and concentrating 30,000 tons of concentrates and has leased for a period of six months, commencing with January 1, 1914, the Cedar Point furnace of the Northern Iron Company at Port Henry, N. Y. It is proposed to use in the mixture Witherbee-Sherman ores, starting with a comparatively small percentage of MacIntyre concentrates and gradually increasing. This is probably the first test of ores of this character and of this extent.

About 1840 a blast furnace was erected on this property of three or four tons capacity and put in operation. About 1850 this furnace was replaced by one of about 15 tons capacity and put in blast shortly thereafter, and was operated until 1856, using entirely the MacIntyre crude ore. The furnace today is in a good state of preservation, the walls and lining are intact, and an examination of the furnace shows no evidence of any difficulty having been experienced or of its ever having been scaffolded; the blow-out was perfectly clean to below the tuyeres. An examination of the slag would indicate that it was rather more fluid than the average charcoal slag. A recent analysis of some of the pig iron made at that time shows titanium 0.07 per cent., vanadium 0.29 per cent., chromium 0.109 per cent. It is believed that the presence of these elements will give to the iron superior qualities. An analysis of a piece of wrought iron manufactured from this pig iron shows that the vanadium and titanium remained in the wrought iron. A concentrating plant with a daily capacity of 600 tons is in process of erection at the foot of Sanford Hill, at the mouth of the quarry.

Transportation Arrangements

The MacIntyre Iron Company has completed surveys for a railroad from the mines to Fort Ticonderoga, on Lake Champlain, with the grade in favor of the load for the entire distance, and has secured practically the entire right-of-way and a large property on Lake Champlain for terminal and dock facilities. The State barge canal connecting Lake Champlain with the Hudson River near Troy is rapidly approaching completion and, when finished, barges of 2000 to 2500 tons capacity can be utilized.

On the property of the MacIntyre Iron Company are several water-power sites which are capable of power development—more than sufficient to run the concentrator, the mines and the railroad. With cheap mining and concentration, cheap railroad transportation to Lake Champlain and barge transportation from Lake Champlain to New York harbor, it is expected that these ores will prove attractive to Eastern furnaces, once their usability is thoroughly determined.

The furnace operation will be under the direct charge and supervision of F. E. Bachman and furnacemen will be welcomed at Port Henry while the test is being conducted.

An Important Trademark Decision

The word Keystone, as applied to greases and lubricating oils, belongs to Augustus C. Buzby, doing business as the Keystone Lubricating Company, Twenty-first, Clearfield and Lippincott streets, Philadelphia, Pa., because of his introduction of his product under that name in 1885, according to a decision rendered by the United States District Court, Chicago. Complaint was made that the Keystone Oil & Mfg. Company, Chicago, had incorporated in 1900 with the deliberate intention of appropriating the reputation of the name of the Philadelphia product, and the court holds that such was the case, despite the fact that the product of the defendant was not marked with the trademark nor was it sold as Keystone grease. The court decided that, as the complainant had a valid trademark, "the defendant had no right to use the word Keystone in its corporate name so far as the sale of lubricating grease by it is concerned, if the public is thereby misled," and ordered that it should incorporate its lubricating grease business under some other name or adopt some other plan to avoid infringement.

Grinding Machine for Different Levels

A Pratt & Whitney Disk Type also Producing Circumferential Finish Lines

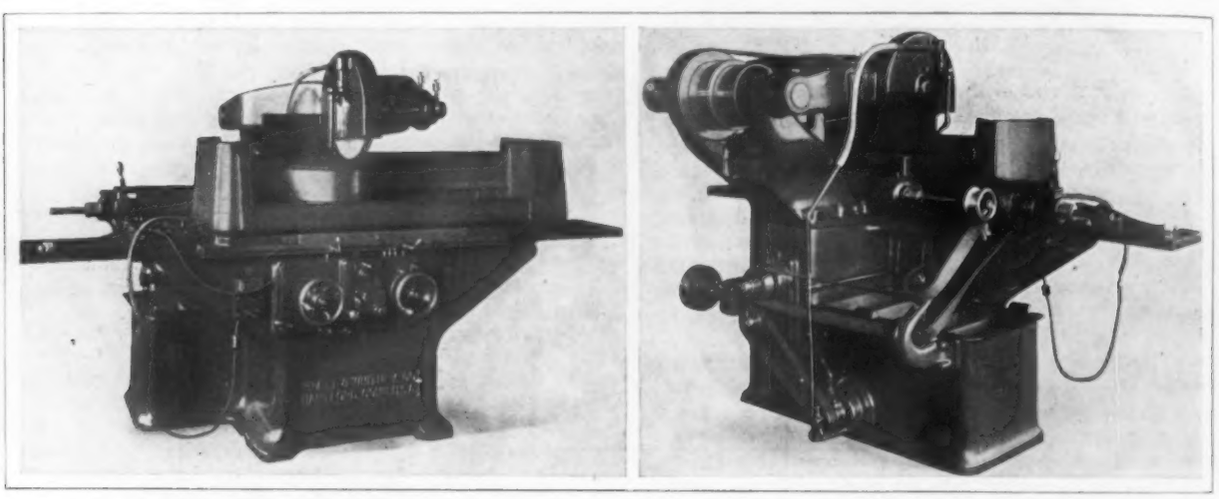
For performing circular grinding operations where the surfaces to be finished are of various hights, and also for certain classes of work where it is preferable to have the finish lines circumferential instead of radial, which is the case where a cup wheel machine is used, the Pratt & Whitney Company, Hartford, Conn., has developed a disk grinding machine of a special type. Other uses to which this machine has been put are the grinding of thin, hardened disks, since there is comparatively little heat generated during the grinding process, thus permitting the work to be ground without warping and also for the finishing of such work as large piston rings.

The bed, table and table feed mechanism are similar in design to the company's well-known 14-in. vertical surface grinding machine. The construction also embodies a large powerfully driven wheel mounted at right angles to the work, the design being such that a liberal supply of water may be used during the grinding operation. The work holding problem is simplified to a considerable extent by the inclusion of a rotary magnetic chuck as a part of the regular equipment. The bed is of massive proportions and is also internally braced. At the same time the design is compact, the various units being located so as to be readily accessible. Wide bearing surfaces of V and flat types, which are automatically oiled by rolls dipping into oil reservoirs in the bed, are provided. A pan surrounds the rear of the bed to collect the water and receive the grinding residue, its location being such as to make it readily accessible for cleaning.

The table is heavy and as an additional precaution against warping and twisting through torsional strain, ribbing is provided. It is slightly longer than the bed and the traveling action of the latter is relied on to keep these members perfectly true. Guards are provided at each end of the table to cover and protect the bearing surfaces from injury. A spacious pan is cast integral with the table for controlling the water. An automatic reciprocating motion, having a maximum of 24 in. is provided for the table, the desired length of stroke being readily obtained by adjustable dogs. The feed mechanism is embodied in a compact and easily accessible unit. Two rates are provided and both are instantly available by a lever conveniently located at the front of the machine. In the central position, this lever provides a means for stopping the table, and the slow or fast feed is engaged, depending upon whether the lever is in the upper or the lower position. A vertically located rack and pinion drive the table, this construction being relied on to prevent vibrations from showing in the finished work.

The wheel is mounted in an arm fitting on an arbor that in turn is supported upon an upright. Both the arm and the arbor are proportioned to insure strength and rigidity, and it is pointed out that with this construction the wheel is adequately supported without overhang, while the controlling of the vertical feed is also rendered easy. The bearing of the arm upon the arbor is of large proportions, the surface being both dust and water proof. The machine has both hand and automatic vertical feeds, the feed mechanism operating a screw which engages the underside of the arm upon which the wheel is mounted. The elevating screw and the nut are both of liberal proportions and are readily accessible. The power feed is readily engaged by a ratchet wheel and pawl and it may be accurately gauged by a large dial, the periphery of which is graduated in thousandths of an inch. At the end of each stroke, when the wheel is entirely clear of the work, the feed automatically stops.

The wheel spindle is of hardened, ground and lapped tool steel and runs in bronze boxes which are mounted in conical seats to be easily accessible for adjustment and are both dust and water proof. Special care has been taken of the lubrication, large self-feeding oilers being provided. The wheel mount is self-contained and the spindle end has been made conical and provided with a key for the accommodation and positive driving of the mount. The machine is designed with a view to using wheels up to a maximum diameter of 18 in. and a 2-in. face, although by the use of packing rings it is possible to use wheels with faces as narrow as 1 in. The grinding capacity of the machine is work 16 in. in diameter and 6 in. wide.



Operating Side — Driving Side

Two Views of a New Disk Grinding Machine for Use Where the Work to be Finished is at Different Levels

The wheel spindle drive is designed to give ample power for any demands that may be made upon it. Two wheel speeds of 1300 and 1600 r.p.m. are provided by a two-step cone pulley, thus enabling the speed to be increased when the wheel is reduced by wear. The spindle is driven by a 3½-in. belt, running over a pulley 8 in. in diameter, with 3¾-in. face. The countershaft pulleys are 14 in. in diameter, with a face width of 8 in. The belt is 8 in. wide and the countershaft operates at a speed of 425 r.p.m.

To keep the wheel free and prevent clogging and also to prevent heating of the work a liberal supply of water is provided by a new type of pump which is made and located so as to dispense entirely with the usual idler pulleys. There is an exceptionally large water tank on the back of the machine, located in an accessible position where it can be easily cleaned. The design of the machine is such that the water is returned to the tank without passing through pipes, thus making the collection of the dirt and grit in inaccessible places practically impossible. The pipe through which the water is conveyed to the grinding wheel is attached to the guard and can be easily adjusted or instantly removed as desired. Guards are provided for both the table and the wheel to prevent the escape of water.

The rotary magnetic chuck, which is 16 in. in diameter and 10 in. wide, is of the same type as that used on the builder's standard vertical surface grinding machines. It operates at a speed of 103 r.p.m. and is both dust and

water proof. The driving units are located outside of the wheel guard, thus making it practically impossible for water to get into the chuck. Large self-feeding reservoirs are employed to lubricate the chucks throughout.

The regular equipment furnished with the machine includes a water pump and the necessary piping, one grinding wheel, a rotary magnetic chuck, a wheel truing device, a set of wrenches and a tight and loose pulley countershaft. The floor space occupied by the machine measures 70 x 140 in. and the net weight, with regular equipment, is 6700 lb.

Book Reviews

Laboratory Manual and Testing Materials, by William Kendrick Hatt and H. H. Scofield. Pages, IX+135. 5 x 7½ in.; illustrations, 29. Published by the McGraw-Hill Book Company, Inc., 239 West Thirty-ninth street, New York City. Price $1.25 net.

This manual, one purpose of which is to relieve the instructor from the necessity of explaining the details of mechanical testing, etc., comprise approximately one-third matters of greater educational importance, is the outcome of the operation of the laboratory for testing materials of Purdue University for a period of 18 years. The work in its original form was published by the senior author, who is the professor of civil engineering and director of laboratory for treating materials at that institution, and later with the assistance of Professor Scofield, who is the assistant professor in the laboratory, the manual was enlarged. The book has again been augmented, the list of experiments having been increased and a more complete treatment of the machines and apparatus employed added.

Descriptions of testing machines and instruments, definitions of terms, statements of phenomena occurring in mechanical testing, etc., comprise approximately one-third of the book. The main part of the text is a systematic set of instructions for making all of the ordinary mechanical tests on metal, wood, cement, concrete aggregate and road materials. A compilation of formulas, a table of the qualities required in iron and steel by the American Society for Testing Materials and the full text of cement specification of that body, sketches of standard forms of steel test pieces and a table of strength figures are contained in several appendices.

The book, as stated in the preface, is intended for instruction purposes and for that reason the brevity and sketchiness of the general information contained in the first part of the book adapt it for the use of college students, while the synopsis of the tests would hardly be found of value outside of a college laboratory.

The Rolling Mill Industry. By F. H. Kindl. Pages 76, 6½ by 9¼ in. Published by the Penton Publishing Company, Cleveland, Ohio. Price $2; in flexible leather $3.

A condensed and general description of iron and steel rolling mills and their products is undertaken by the author. Discussion of the details of producing any particular material is avoided. Charts are given showing graphically the production of semi-finished and finished products from 2000 lb. of iron ore. Various tables are included, giving statistical information. There are numerous half-tone illustrations of important rolling mill installations in this country.

The Income Tax Law of the United States of America. Analyzed and clarified by Albert H. Walker, floor 10, Park Row Building, New York City. Pages, 132, 6 x 9 in. Published and for sale by the author. Price $1.

The analysis here presented by Mr. Walker, who is author of "Walker on Patents" and "The History of the Sherman Law," is the outcome of weeks of careful study of the income tax law, which have resulted in a clear exposition of the manner in which its provisions are to be applied. The law is so complicated that an analysis of this character by a lawyer so competent as Mr. Walker has been greatly needed. The problem of interpreting this remarkable specimen of lawmaking is a most difficult one, as is shown by the statement in a financial journal that one important fiscal agency is reported to have employed three leading law firms to get some idea of its duties and responsibilities, only to secure three conflicting opinions.

Hydraulic Steel Cable Shearing Machine

A horizontal shearing machine for cutting steel cables 4½ in. in diameter and large sizes of rolled steel has just been placed on the market by the Watson-Stillman Company, 190 Fulton street, New York City. It is capable of exerting a pressure of 175 tons. The special advantage claimed for a horizontal machine of this class as compared with a vertical one is that more convenient handling of the material to and from the tool is secured, and where traveling cranes are employed for carrying the stock this advantage is even greater.

On account of its weight the machine is mounted on flat wheels to render it more convenient for use wherever

A Recently Developed Hydraulically Operated Shearing Machine for Cutting the Larger Sizes of Rolled Steel and Steel Cables 4½ In. in Diameter

it is needed in shipyards, factories or machine shops. The pump is entirely independent of the cylinder, thus making the valves and pump parts readily accessible. In shops which are equipped with a hydraulic system the hand pump can be dispensed with and direct connection made to the high pressure pipe line.

The ram and cutter are guided by a machined groove to insure accurate work. In operation, after the ram has made its cutting stroke, the pressure is released by turning the handwheel at the right of the pump and the ram is returned by the rack, pinion and lever arrangement, the pinion lever being shown pointing toward the left. Reliance is placed upon the mounting of the pinion upon a spring to protect the teeth of the rack and pinion from excessive stresses due to the jump of the ram at the instant of rupture. The exact pressure is indicated at all times by the gauge at the right, which is directly connected with the pipe line.

A correction should be made in our report of W. R. Shimer's paper on the "Over-Oxidation of Steel," read at the meeting of the American Institute of Mining Engineers, October 16 and 17, and reported in *The Iron Age* of October 23. The obvious error consisted in using the word "probable" for "improbable" in the sentence: "It seems highly improbable under the usual conditions of Bessemer and open-hearth practice, with the additions of recarburizers, that a steel of over 0.030 per cent. oxygen can be obtained, etc."

The Steel Corporation Dissolution Suit

Frank S. Witherbee Gives Interesting Testimony—Both Competitors and Customers of the Corporation Testify for It

Testimony of Frank S. Witherbee

The chief witness for the United States Steel Corporation in the hearing in New York City on Wednesday, October 22, was Frank S. Witherbee, of Witherbee, Sherman & Co., Inc., who testified with regard to the iron-ore properties of his company in New York State and in Cuba. These properties comprise 62,000 acres in New York State and 9000 acres in Cuba. The Cuban property is not being worked at present. Of the company's New York ore lands, which are in the Adirondack region, less than 1000 acres have so far been worked, and the ore in sight is greater in volume than when mining operations were commenced in 1849. The company and those with which it is affiliated are now producing in the Port Henry or Mineville region about 1,000,000 to 1,200,000 tons of ore annually, and much more than this could be taken out if there were a market for it. The ore is of high grade. Years ago it found a market as far distant as the Pittsburgh district until the development of Lake Superior mines enabled Lake ores to be delivered there at a much lower price.

STEEL CORPORATION HAS NO ORE MONOPOLY

Asked if there was anything to indicate that the United States Steel Corporation has a monopoly of the available iron ores of the country, Mr. Witherbee answered: "My judgment is that the Steel Corporation owns a very much smaller proportion of the available ores of the United States to-day than it did when it was formed." He asserted that there is a larger amount of ore in sight in the United States to-day than ever before, and one of the reasons for his statement, he explained, was that a large part of low grade magnetite along the Appalachian chain could now be made merchantable through magnetic concentration.

Mr. Witherbee said he was vice-president of the Tennessee Coal, Iron & Railroad Company for several years prior to 1908 when it was proposed to raise $8,000,000 "around the table." He said that the company was in a miserable condition and that he did not believe the $8,000,000 would right the situation, so he resigned. He said that in 1904 he saw James Gayley, then first vice-president of the Steel Corporation, relative to purchasing the Tennessee Company, but nothing resulted.

Asked regarding the report that he was interested in a project to build blast furnaces near Perth Amboy, N. J., Mr. Witherbee said that the building of such furnaces was contemplated. He figures that his company can deliver iron ore to New York harbor from the Port Henry district after the opening of the New York State barge canal at a cost of 3c. to 6c. per unit. In connection with this, he explained that he has studied canal costs in Europe and was a member of the Roosevelt commission which formulated the New York barge canal system. Mr. Witherbee testified that his company sells considerable ore to the Lackawanna Steel Company, Buffalo, and this is paid for at the same rate for which Lake ore can be obtained there. The Port Henry ore, however, because of its superior iron content, brings a higher price than the Lake ore per ton. He said that after the completion of the barge canal it will cost about one-third of one cent less per ton to deliver ore from Port Henry to New York barbor than to Buffalo. He also said that after the completion of the barge canal it will be cheaper to bring Lake ore to New York than to Pittsburgh.

HOW THE TROY STEEL & IRON COMPANY WAS THROTTLED

Cross examination developed some interesting facts regarding the experience of the Troy Steel & Iron Company, Troy, N. Y., of which Mr. Witherbee was president in 1897-8, after its reorganization, and receiver in 1899, which was before the Steel Corporation was formed. The following is part of the examination on this subject by Mr. Colton, attorney for the Government:

Q.—It had back of it the Rockefellers and Morgans, did it not?

A.—Yes. But their interest was not united. The Morgan interest was a stock interest and the Rockefeller interest was a bond interest and they did not agree on policy.

Q.—What drove that company out of business?

A.—The Carnegie Steel Company, although not because it had an advantage in regard to iron ore. In fact, it was the other way around, as the Troy Company could make pig iron cheaper than the Carnegie Company. The Carnegie Company used to go to the customers of the Troy Company and offer to sell at 50c. per ton under the lowest price of the Troy Company. For instance, we started in selling billets to the Washburn & Moen Mfg. Company in Worcester at $22 a ton, delivered, and the Carnegie Company kept on pursuing this policy until the contract had finally been pushed down to $16.50. The production costs at Troy had not yet been brought down as low as we expected to make them, consequently the company was unable to survive this competition and it went under in 18 months. The Carnegie Company succeeded in doing as one of its officials had said at the time we started in business, "We propose to strangle the Troy child at its birth."

Mr. Witherbee, on further cross examination, admitted that he had been a witness at several of the hearings before different Congressional committees and testified there that a duty on ore was needed to protect his Adirondack ores.

The attorneys for the Steel Corporation then called several witnesses who are purchasers of iron and steel products to show that prices and quotations have generally varied, and that there has been "real, live, active" competition for their trade favors, both from the subsidiaries of the corporation and various independent manufacturers throughout the country. Those who testified on this occasion were: William B. Shafer, first vice-president A. E. Norton Company, steel fabricator, Glenridge, N. J.; Louis Hassinger, president of John Trageser Steam Copper Works, Bronx, N. Y., and Hugh E. Cooper, president National Sheet Metal Roofing Company, Jersey City, N. J.

Competition in the Structural Steel Trade

On Thursday Louis J. Horowitz, president Thompson-Starrett Company, builder of the Woolworth, New York City Municipal and other large structures, testified for the corporation from the standpoint of a large buyer of structural steel. He admitted that under his predecessor, Theodore Starrett, his company had sacrificed competition to friendship in the placing of contracts for structural material with the American Bridge Company, the Steel Corporation subsidiary, in preference to independent concerns. Mr. Horowitz declared, however, that upon his becoming the president of the construction company, about four years ago, he established the rule of "we want competition and no friendship" in letting contracts for structural steel and since that time the American Bridge Company had secured a smaller proportion of his company's business.

Notwithstanding his rule of "competition and no friendship," however, Mr. Horowitz said that the American Bridge Company has been able to meet "such large requirements to the extent of being awarded an average of 50 per cent. of the Thompson-Starrett Company's contracts." He insisted that the prices and bids made varied constantly, and said that some of the independents, including the Bethlehem, Pennsylvania and Eastern Steel companies, had been awarded large contracts for structural materials as well as the Steel Corporation's subsidiary.

Citing as an example of where "no competition" was much more effective in bringing a lower price on structural material, Mr. Horowitz told of awarding the contract for 22,341 tons of steel for use on the Woolworth Building to the American Bridge Company at a price $9

per ton lower than that offered by the Pennsylvania Steel Company for 25,334 tons of steel to build the Municipal Building. The American Bridge Company was given the contract for the steel on the Woolworth Building, he explained, because its price was right, without receiving bids from other concerns. Both President Farrell of the Steel Corporation and President Hatfield of the American Bridge Company were anxious to land the contract and made the right price without competition.

Mr. Horowitz intimated that his company has purchased approximately 178,000 tons of steel during four years, of which approximately 85,485 tons was purchased from the American Bridge Company.

Testimony from Various Witnesses Regarding Competition

Edward N. Chilson, manager of purchases for the J. G. White Engineering Corporation, said that he buys large quantities of wire, wire rope, tubes, structural shapes, bars and other steel products and contracts are awarded after bids are received from a number of makers. He testified that there is a uniform list price sent out by all manufacturers on steel tubes and pipes, but that there are varying discounts from this price. In the cross examination Judge Dickinson, for the Government, brought out instances where the discounts submitted by different concerns were also the same.

Percy F. Hogan, president of Hogan & Son, steel jobbers, New York, testified that his company buys annually about 5000 tons of tool, sheet, alloy and chrome vanadium steels and flat wire, of which about 25 per cent. is purchased from subsidiaries of the Steel Corporation. During cross-examination he recalled that about five years ago the American Steel & Wire Company caused a drop of about 25c. per 100 lb. in the price of flat wire at that time by coiling wire and selling it at the lower price. This caused the other wire manufacturers to reduce their prices to a similar level, and although flat wire prices had previously varied for two years or more it remained stationary. The witness said that approximately 20 per cent. of his wire supplies is purchased from the American Steel & Wire Company and the remainder is distributed among various small independents.

Harry W. Goddard, president Spencer Wire Company, Worcester, Mass., testified as to the existence of active competition in the wire trade. His company has increased its business since 1903 about 95 per cent. and it now makes about 400 wire products. On cross examination he said that for the last 10 years, as between the different manufacturers of wire rods, prices of wire rods have been substantially uniform, the only appreciable fluctuations taking place in 1905 and 1906.

On Friday, Waddill Catchings, one of the receivers for Milliken Brothers, Inc., New York, structural steel fabricators, said that in conducting the business of his concern, materials were purchased from the United States Steel Corporation, Jones & Laughlin Steel Company and Bethlehem Steel Company. Prices were often uniform, he said, and he had sometimes thought pools existed, but in general he had had no difficulty in obtaining competitive bids.

W. C. Hulshize, purchaser for the Harold McCalla Company, Philadelphia, dealer in wire nails, plates, hoops and other staples, said he had found plenty of competition, and that manufacturers were always after his company's trade.

Edward H. Mason, Mason Mfg. Company, Providence, R. I., testified that his company uses about 40,000 boxes of tin plate per year, buying the greater part of it from the Phillips Sheet & Tin Plate Company, and that the American Sheet & Tin Plate Company, subsidiary of the Steel Corporation, gets but little.

Mark Fischel, purchasing agent of the Universal Caster & Foundry Company, Newark, N. J., told of the purchase of steel hoops and wire by his company. He said that the materials are bought in the open market and most of them from independent manufacturers. He testified that the corporation has no monopoly and that independents procure their fair share of business. R. D. Samuels, purchasing agent of the National Enameling & Stamping Company, gave testimony to the same effect.

More Consumers and Competitors Give Testimony

At the hearing on Monday, October 27, Robert J. Maharg, president Selzer-Klahr Hardware Company, Philadelphia, testified that for the last nine years his concern has confined its annual purchases of from 20 to 25 carloads of wire nails exclusively to the American Steel & Wire Company, because that branch of the Steel Corporation has been so "uniformly clever" in its treatment. Other manufacturers had, unsolicited, continually attempted to secure orders and at prices generally a trifle lower than those of the Steel Corporation subsidiary. The outsiders, however, the witness stated, had never secured any business, because, whenever they made a lower bid that was verified, the news would be brought to the attention of the American Steel & Wire Company, which invariably resulted in that company meeting the lower bid.

He explained that under the arrangements with the Steel & Wire Company, his concern was able to make very satisfactory contracts for nails on its requirements for given periods and the delivery was prompt. When other nail manufacturers besides the American Steel & Wire Company made bids for his nail orders, the witness said, it was surprising to see the general uniformity in their quotations as compared with those of the Steel Corporation's subsidiary. At times he found a variation, however, sometimes as much as five cents a keg running down as close as two and a half cents a keg.

A TIN PLATE AND CAN MAKER TESTIFIES

Franz H. Assman, president Standard Tin Plate Company, testified that the stock of that concern is owned entirely by the Continental Can Company and his own family and that of Edward Morton, and they in turn hold practically all of the stock of the Continental Company. Since 1910 he said the Standard Company has been buying the bulk of its tin bars from the Carnegie Steel Company. The Standard Company sells about 50 per cent. of its output to the Continental Can Company, the latter being the most formidable competitor of the American Can Company.

Mr. Assman said he was formerly president of the American Can Company. Questioned as to the relations between that company and the American Sheet & Tin Plate Company while he was president, the witness admitted that reductions in the ordinary current prices were given to the American Can Company by the Steel Corporation's subsidiary. This was under a verbal arrangement, he explained, and amounted to approximately 20c. a box of a reduction.

The Continental Can Company, Mr. Assman declared, has experienced a very successful trade life, starting with $500,000 capital in 1905 and now having a capitalization of $13,500,000 and affording the chief source of competition to the American Can Company.

Chester A. Wales, purchasing agent for the Federal Signal Company, Albany, N. Y., testified that all his purchases were made on a competitive basis during the last eight years, and he never found any evidence that a combination or agreement between manufacturers to fix prices existed. He always found quotations varied.

Our Huge Foreign Trade in September

According to the monthly statement of the Department of Commerce, September made a new record for the foreign trade of the United States, both as to imports and exports. The value of September imports was $169,562,757, against $144,819,493 in September, 1912, the former high record in September imports. September exports were valued at $218,185,451, against $199,678,062 in September, 1912, the former higher record September in exports. The excess of exports over imports for September was $48,622,694.

The statement sets forth that it is proper to add that the figures of September imports include the importations during the first three days of October, which were transferred to the September totals in order that the October import statement might begin with the operations of the new tariff law which went into effect on the morning of October 4.

Thomas Shaughnessy is reported by Canadian papers as announcing that the Canadian Pacific experiments in the Rocky Mountains with electrification are only preliminary to the electrification of the entire system if the experiments are successful. In the West there will soon be entire divisions operated exclusively by electric locomotives for handling freight as well as passenger traffic.

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CONTENTS.

The Manufacture of Armor Plate..... 953
Effect of Phosphorus on Cast Iron..... 955
A Four-Spindle Flue Sheet Drilling Machine..... 955
Steel Manufacturers Speak Hopefully..... 956
Large Texas Steel Plant Proposed..... 960
A Combined Feed-Water Heater and Meter..... 961
Automatic Band Saw Sharpening Machine..... 961
Latest Blast Furnace at Youngstown, Ohio..... 962
A New 36-in. Open-Side Planing Machine..... 965
The Sherman Law Attacked..... 965
Progress in Steel Mill Roll Design..... 966
National Machine Tool Builders' Convention..... 972
Meeting of Machine Tool Dealers..... 975
A Six-Chaser Stationary Pipe Die Head..... 976
Receivers for Standard Roller Bearing Company..... 976
A Heavy 30-in. Rapid Production Lathe..... 977
Extras, the Reason and Necessity Therefor..... 978
Steel Pans for Lathes and Other Machines..... 980
What May Be Done with Tubing..... 980
Pig Iron from Titanium Iron Ores..... 981
An Important Trademark Decision..... 981
Grinding Machine for Different Levels..... 982
Book Reviews..... 983
Hydraulic Steel Cable Shearing Machine..... 983
The Steel Corporation Dissolution Suit..... 984
Our Huge Foreign Trade in September..... 985
Steel Prices Only One Export Factor..... 986
Lake Ore Supply Easily Increased..... 987
Increase in the Unemployed..... 987
Correspondence..... 988
United States Steel Corporation's Earnings..... 988
Mineral Production of Canada..... 989
Departmentizing a Great Business..... 989
No Shut-Downs of Entire Plants..... 989
Austrian Steel Prices Decline..... 989
The Iron and Metal Markets..... 990
Protest from Steel Corporation Employees..... 1002
New Pennsylvania Rolling Mill..... 1002
Personal..... 1003
Obituary..... 1003
Pittsburgh and Valleys Business Notes..... 1004
Channel Passes and the Pitch Line..... 1005
The Cotton-Tie Scarcity..... 1006
Trade Publications..... 1007
The Machinery Markets..... 1008
Trade Publications..... 1016

Steel Prices Only One Export Factor

Those who have lately been studying steel prices in foreign markets with a view to gauging the probable effect of the new tariff upon our own market have been struck by the fact that the average of Continental prices for export is well below the average of British export prices, and in some cases the divergence is quite large. Surprise is naturally created, not merely that Great Britain maintains her export trade so well, but indeed that she preserves her own domestic markets.

It has easily been seen that if imports into the United States should be feared at all, it would be imports from Germany and Belgium, and to a limited extent from France, rather than from the United Kingdom. Apart from this, the interesting question is presented, how it comes that Great Britain is able to maintain an export trade averaging this year a rate of over 5,000,000 tons per annum, when most of the Continental prices are much lower than the English. Merely for example, merchant steel bars f.o.b. Antwerp are quoted at £4 9s., against an English export price of £6 9s., a divergence of £2, or $8.70 per net ton.

A number of influences contribute to the maintenance of this alignment. In the first place, British exports run very largely to British possessions, and in this trade the British exporters have better facilities for transacting the business, while sentiment doubtless also plays an important part. Again, there are differences in quality, some of them being extreme differences. Then it is a fact easily culled from the export statistics that the British trade runs very largely to certain descriptions of material, in the production of which the English presumably excel. Thus, instead of the leading item in British exports being some heavy tonnage form, like rails, plates, structural shapes, etc., this leading item is none other than galvanized sheets, British exports of that line, in flat and corrugated, running this year at no less than 750,000 gross tons per annum, against 510,000 tons of rails, 140,000 tons of plates and 120,000 tons of structural shapes. Even to Germany England exports some moderate sized tonnages of black and galvanized sheets, black plates and tin plates.

Some years ago the British iron and steel trade was much disturbed over what was commonly called the inception of a "German invasion" in its own home market. A very gloomy view was entertained of the future, and the proposition to establish a tariff gained considerable support. After the lapse of some years we are now able to see the working out of the economic situation. While the German export trade has greatly increased, the gain has hardly been at the expense of the British trade, and the British home market has not been seriously affected. One of the interesting developments is that while, as noted, the United Kingdom is exporting galvanized sheets at the rate of 750,000 tons a year, and is also exporting black sheets, black plates and tin plates, there is being drawn an annual tonnage of 215,000 tons of sheet and tin plate bars from Germany. The total iron and steel imports are running at the rate of 2,250,000 tons.

Some interesting inferences may be drawn from these facts. In the first place comparisons of mere quotations upon descriptions of material assumed to be identical in different markets are altogether inconclusive as indications of how material will actually move. There are to be considered quality, adaptability

and many other elements. Again, the fact that a country finds occasion to import large quantities of iron and steel in general does not preclude it from conducting a large export trade in iron and steel. Its imports may run large as to some descriptions of material while its exports run large as to other descriptions.

Nor can any generalization be made, in the matter of possible imports and exports, that a line may be drawn as to degree of finish whereby, perhaps, a country would import the cruder materials and export the more finished; for in the case of Great Britain the situation is quite involved in this respect. The iron ore imports are very large, with practically no exports, while the exports of pig iron are also very large, with very light imports, whereas passing to unfinished steel there are fairly large imports and practically no exports. Then in the so-called "finished products" of the steel industry, Great Britain has imports of no small proportions, though exports predominate very markedly.

Since the cessation of any considerable tonnage of iron and steel imports into the United States some quarter century ago we have occupied a position of isolation. Our new tariff threatens, though it cannot be said to promise, a considerable tonnage of imports again. In view of what has developed abroad, it can hardly be proved that such a condition would in the long run be entirely disadvantageous to the country. The readjustment might be trying, but the eventual condition might prove fairly satisfactory. If one should deny that such an outcome is possible he might be called upon to defend the position that the United Kingdom would now have an export trade of 5,000,000 tons of iron and steel a year, if ten years ago the country had adopted a protective tariff. Probably the average student of such affairs would hesitate to undertake the defense of such a proposition.

Lake Ore Supply Easily Increased

The increase in pig-iron production and the increased shipments of Lake Superior ore this year direct attention to the extent to which the consumption of ore from the Lake Superior district is likely to increase under normal conditions within the next two or three years, taking into consideration the increased demand for iron and steel products due to the country's growth.

The production of coke and anthracite pig iron in the United States in the first nine months of 1913 was 23,959,090 gross tons. With an average production of 2,500,000 tons per month for the remainder of the year, or less than the September production, the total coke and anthracite production for the year would approximate 31,500,000 tons. However, if the total is only 31,000,000 tons this will be a satisfactory gain over 1912 when the total production, including also charcoal pig iron, was 29,727,137 gross tons.

If all the present available blast furnaces in the country were operated at their maximum practical capacity, which would be 85 per cent. of their nominal capacity, the production of coke and anthracite pig iron in a year would be about 35,000,000 tons, which would mean the consumption of about 70,000,000 tons of iron ore.

The total production of iron ore in the United States in 1910 was 57,014,906 tons, and in 1912 it was 55,150,147 tons. Lake Superior ore shipments last year reached 48,211,778 tons as compared with 43,442,397 tons in 1910. Early in 1913 predictions were made that Lake Superior ore shipments this year would reach 55,000,000 tons, but the more conservative estimate of 50,000,000 tons now appears more likely.

With all the blast furnaces in the country running at their maximum practical capacity, which means of course that a number of furnaces that have been inactive for some time would be in operation, it is estimated that in the production of 35,000,000 tons of pig iron the proportion of Lake Superior ore consumed would then run close to 57,000,000 tons. Allowing some increase in other ores, the remainder of the 70,000,000 tons of ore required would include approximately 2,500,000 tons of foreign ore, 7,000,000 tons of Southern ore and 3,500,000 tons of ore from Eastern and other states not included in the above.

Whenever conditions in the iron and steel industry create a demand for an increase in the output of Lake Superior ore to the extent of 7,000,000 tons over this season's expected shipments, no difficulty will be found in providing for the delivery of the increased tonnage to the blast furnaces, as has been proved by the mining and delivery of this season's output. With the present improved methods of mining operation and added equipment, it would be hard to estimate with any degree of accuracy the maximum tonnage that could be mined in the Lake Superior district in a year. Owners of certain underground Lake Superior mines discontinued this year the sale of some ores, believing that they had sold the maximum output, but late in the season they found good-sized stock piles on their hands because of a greater production than was expected.

In the matter of the supply of Lake ore vessels, the present season has shown that there are sufficient freighters to carry several million more tons of ore than will be brought down the Lakes this season. During the record-breaking month of July, when ore shipments exceeded 8,000,000 tons, the capacity of the Lake fleet was not taxed. While the increase in vessel tonnage has been small in the past year or two, the addition to the ore handling capacity at the lower Lake docks during that time, due to the installation of new and larger handling plants, has made the unloading of boats more rapid, thus giving the carriers better dispatch and increasing the season's capacity of the fleet.

Increase in the Unemployed

Conditions in regard to the employment of workingmen have been completely reversed since last spring. At that time the supply of labor was much below the demand. In every direction employers were seeking men for the purpose of keeping their organizations equal to the demand they were then experiencing. Numerous employers found the ordinary employment agencies unable to supply workmen, and at incoming steamers direct representatives of employers awaited the immigrants for the purpose of securing some of the newcomers for their service. Probably never before was there such a scarcity in the floating supply of labor.

Within the past month a noticeable change has occurred in the general conditions affecting labor. There has been no collapse in trade, no financial disturbance to bring about the sudden termination of industrial operations, no general suspension of manufacturing, but there appears to have been a decided

weakening of the vitality so vigorously manifested six months ago. A gradual withering has been felt in practically all branches of trade. This is not confined to manufacturing operations, but is evident in other lines of business activity. The daily press is reporting from day to day increasing dullness in various localities, and our own columns are bearing testimony to the fact that the ranks of the unemployed are growing in nearly all sections of the country.

It looks as if Secretary Redfield, of the Department of Commerce, will have his hands busy in investigating general reductions of wages, of which he again served notice on employers in an address delivered at Flint, Mich., on Wednesday, October 22. The falling off in trade will naturally bring with it greater competition for the smaller volume of business, and this of course invariably means reductions in wages. If such reductions become widespread, as would now seem to be indicated, the Department of Commerce may find it difficult where to decide to begin its investigation. Wage reductions are already being made on the other side of the Atlantic as a consequence of the decline in business experienced there this autumn. These declines are taking place in face of the fact that our foreign competitors are expecting to be enabled to do more business in this country under the favors extended them in the new tariff.

In this connection it is interesting to note that a bill has been introduced in the United States Senate by Senator Lewis, of Illinois, providing for the establishment of a national wage commission, "with authority to adjust claims by employees for higher wages and to fix a minimum wage," for the purpose of equalizing competition between manufacturers whose plants are located in different States in which there is now a wide variance in labor costs. This scheme evidently fails to contemplate such a time as the present in which the supply of general labor is greatly in excess of the demand. While the regarding of labor as a commodity jars the susceptibilities of many persons, it is nevertheless the fact that labor, in its rewards, is as sensitive to the influence of the great law of supply and demand as any necessary of life.

Although the general condition of business is far from being actually depressed, simply showing a falling off from the high pressure of last spring of perhaps 20 per cent., this lowering of activity is sufficiently great to affect a considerable body of working men. It comes at an unfortunate time, when outdoor employment is diminishing and opportunities for seeking other fields of activity are restricted. The misfortunes of the unemployed are to be deplored, but the blame for their unfortunate condition is not to be laid at the doors of their late employers. It will be found elsewhere.

President Gilbert, of the Fulton Market National Bank of New York, told the Committee on Banking and Currency of the United States Senate on October 22 that the existence of a proper and substantial central bank for the rediscount of prime commercial paper would have averted every panic in the American financial world since he entered business life more than 50 years ago.

The Lima Locomotive Corporation, Lima, Ohio, has secured a contract from the New York Central Lines to convert into larger types 30 locomotives in use on the Big Four Railroad. The railroad company reserved the right to have 10 or 20 additional locomotives converted. It is stated that the approximate cost per locomotive for the conversion is from $10,000 to $12,000.

Correspondence

Deoxidizing Cleansers for Molten Steel

To the Editor: In all articles or advertisements by manufacturers of ferrotitanium, the argument is used that the titanic oxide combining with the slag particles, which are in suspension in the molten steel, makes them more liquid or fusible, and because of this, they will more readily rise to the surface and leave a cleaner steel.

Now what actually happens is this, in freeing slag from the steel: The vast difference in specific gravity of steel and slag will insure steel free from slag if (1) the molten steel is in its highest state of specific gravity, i. e., quiet steel, free from gas; and (2) is in the most fluid condition possible.

Now, if aluminum is used for deoxidizing steel we get the molten steel in its highest state of specific gravity and "dead" quiet; but mark this, the metal is also in a more viscous or dead state than when silicon or titanium is used. This is shown when aluminum is used in steel casting heats where a large number of stops are made. A large per cent. of "misruns" will occur and the ladle always has a thick skull and the metal in the last few tons is actually sticky. Steel would surely retain more slag under such conditions than a more fluid steel having equal specific gravity.

Now, ferrosilicon and ferrotitanium not only make quiet steel, but they have the property of making the molten steel very fluid, thus satisfying the conditions for making clean steel. The increased fluidity of the slag, with the increase in the difference in the specific gravity between the slag and steel, allows the molten steel to cleanse itself because of the greater freedom with which the law of bouyancy may act and is not due to the increased fusibility of the slag.

HERBERT F. MILLER, JR.

Williamsport, Pa., October 20, 1913.

United States Steel Corporation's Earnings

Surplus for the September Quarter, $11,348,778

The United States Steel Corporation has issued its statement of earnings, covering its subsidiary companies, for the quarter ending September 30, 1913. It compares as follows with the corresponding quarter of 1912:

	1913	1912
July earnings	$12,936,658	$9,322,142
August earnings	12,657,430	10,583,377
September earnings	12,856,312	10,157,993
Total earnings after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants and interest on bonds of subsidiary companies	$38,450,400	$30,063,512
Less charges and allowances for depreciation, viz.:		
Sinking funds on bonds of subsidiary companies and depreciation and extraordinary replacement funds	7,130,959	7,658,049
Sinking funds on U. S. Steel Corporation bonds	1,697,255	1,627,998
Net income	$29,622,186	$20,777,465
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding	5,614,708	5,683,964
Balance	$24,007,478	$15,093,501
Dividends for the quarter on stocks of the U. S. Steel Corporation, viz:		
Preferred, 1¾ per cent	6,304,919	6,304,919
Common, 1¼ per cent	6,353,781	6,353,781
Surplus for the quarter	$11,348,778	$2,434,801

The earnings for the quarter ended June 30, 1913, were $41,219,813, and for the quarter ended March 31, 1913, were $34,426,801.

The total earnings for the nine months ended September 30, 1913, were $114,097,014, and the total surplus for that period was $32,337,743, against total earnings of $72,992,750 and a deficit, after the payment of dividends, of $3,800,850, for the nine months ended September 30, 1912.

The Linton rolling mill, Linton, Ind., has been sold to the Inland Steel Company, and the plant will be removed to Chicago.

Mineral Production of Canada

The total value of the mineral production of Canada for 1912, according to a report issued by the Canadian Department of Mines, was $135,048,296, as compared with a total of $103,220,994 for 1911. However, attention is called to the long continued labor troubles of 1911 which were of material importance, and brought the 1911 production below that of 1910, which was valued at $106,823,623. The production in 1910 was the highest up to that year, and the figures of 1912 show an increase of 26.5 per cent. in total value over those of the previous high record. The increase in value in 1912 over 1911 is due not only to increased production but also to a somewhat higher range of prices; copper, for example, being valued at 12.376 cents per lb. in 1911 and 16.341 cents in 1912.

Of pig iron, 1,014,587 tons, valued at $14,550,999, was produced in 1912, against 917,535 tons, valued at $12,307,125 in 1911. Copper production in 1912 was 77,832,127 lb., compared with 55,648,011 lb. in 1911. The lead production in 1912 was 35,763,476 lb., against 23,784,969 lb. in the previous year. The nickel production was 44,841,542 lb. in 1912, compared with 34,098,744 lb. in 1911. Zinc ore production totaled 6415 tons in 1912, against 2590 tons in 1911.

The production of metalliferous products in 1912 was valued at $61,172,753, or 45.3 per cent. of the total mineral output, an increase in value over the previous year of $15,067,330, or 32.7 per cent.

Excluding placer and hydraulic gold workings, the number of metalliferous mines shipping in 1912 was 163, as compared with 160 reported in 1911; the number of men employed in 1912 was 10,612, against 9622; wages paid, $10,113,578, against $7,857,580 in 1911; tons of ore mined, 4,104,517, against 3,195,330 tons.

The ores and concentrates treated in smelters in 1912 were 3,005,410 tons, as compared with 2,193,553 tons in 1911. Over 70 per cent. consisted of the copper-gold-silver ores of British Columbia. Of the four copper smelters in British Columbia, three were active in 1912 and a new smelter is being constructed at Anyox, Observatory Inlet, Portland Canal, for the Granby Company, to treat ores of the Hidden Creek mine. The nickel-copper ores of the Sudbury district, Ont., contributed about 24 per cent. of the smelter treated tonnage, the remainder being lead ores of British Columbia and silver-cobalt ores of Ontario.

A continued decline in the production of petroleum is reported. The Canadian output of petroleum a few years ago was about 50 per cent. of the total home consumption. At the present time not over 5 per cent. of Canada's consumption of petroleum and its products is derived from domestic sources.

Departmentizing a Great Business

The Canadian Fairbanks-Morse Company, Ltd., has a large new office building and warehouse nearing completion in Montreal. It is located on the corner of St. Antoine and St. Cecile streets. The frontage on St. Antoine street is 93 ft. and on St. Cecile street 144 ft. It is constructed of reinforced concrete throughout, with brick and terra cotta facings, presenting a handsome appearance. Two high-speed freight elevators and one passenger elevator are installed.

The building has seven floors and a basement. The ground and first floor will be used for combined offices and samples, as well as a retail sales counter, the intention being to have the goods pertaining to each department in close proximity for the convenience of customers. The third floor will be occupied by the head office staff, advertising, purchasing and freight departments. The fourth, fifth and sixth floors will be used for the storage of goods, and the top floor will be equipped for repair shop. The building will be well lighted, as there are windows on three sides. The shipping will be done from the basement floor at the rear, which is below the level of St. Antoine street, and provision has been made for a 5-ton motor truck to enter the basement. There will be from 12 to 15 separate telephone lines in and out of the building, with two switchboard operators, and an internal telephone system as well. The completed structure will be of the most modern type of office building in Canada.

The Canadian Fairbanks-Morse Company, Ltd., is the largest concern of its kind in the Dominion. It has branch offices in all the important cities, from coast to coast, and is literally a large department house for machinery and mechanical goods, the business being divided into a number of departments in order that it may be handled more expeditiously and to the best interest of the customer. These departments are as follows: Scales, engines, electrical supplies, transmission supplies, small tools, automobile accessories, valves and steam goods, pumps, machinery, railroad and contractors' supplies, safes and typewriters, motor trucks.

Each department is composed of a great many different lines. The company claims that this bringing together of a vast number of lines and classifying them according to departments is the kind of combination in industry that makes for efficiency, economy and better service. It is found in practice to be a great convenience for those in need of machinery and mechanical goods to be able to purchase their supplies from one house.

The new Montreal building is one of a number of extensions recently made by the company. Last year it erected in Toronto a plant for the manufacture of tractors which is claimed to be among the best equipped of its kind in the world.

No Shut-Downs of Entire Plants

The presidents of the subsidiary companies of the United States Steel Corporation held a meeting at Gary, Ind., on Thursday, October 23. Chairman E. H. Gary in an interview said that the principal topic discussed was the state of business and the prospects for iron and steel works. There was general agreement in the view that while there has been some recession in business and it might be expected to continue for a time, a change was looked for which by spring or earlier would bring a satisfactory volume of trade. Concerning reductions in forces, Judge Gary said:

"The subject of laying off men was not considered at the presidents' meeting. The practice has been that in case of a decrease of business we would lay off enough men to close one or more mills at the plant affected, which would give us a chance to make repairs and put in improvements at the mills so closed which were impossible while the mill was in operation. The mills closed in such dull times, however, really are only emergency mills intended to be run in rush times. Whether any such shutdowns may take place this winter, I cannot say at present. No mills are shut down at present. They are all running. I hope none of them will be shut down, and it is certain that we will not shut down any unless we have to. All the plants are running with regular forces. This includes the emergency mills."

Austrian Steel Prices Decline

The Austro-Hungarian Steel Syndicate has reduced the prices of bars, plates, sheets and joists. This has been brought about by the fall of prices in Germany so as to meet the export quotations of that country, and also to contest for the domestic trade with the Czech iron and steel works in Rokycan and Hradeck. The average of the reduction made in bars, as given by London papers, is about 16s. 8d. per ton. This reduction is graded, being least for those localities farthest from the center of the contested area. In Prague the concession amounts to 20s. 10d. per ton; in Vienna, 10s.; in Moravia and Silesia, 6s. 3d. to 10s., and in Galicia, 6s. 3d. to 6s. 8d. per ton. Light sheets have also been reduced on the average by 14s. 7d., plates by 12s. 6d. and joists by 5s. per ton.

The Carborundum Company, Niagara Falls, N. Y., has just completed its new plant at Trafford Park, Manchester, England, and Archie D. Kysor, formerly purchasing agent at Niagara Falls, has been appointed works manager. This latest extension gives the company works in France, Germany and England making carborundum and aloxite wheels, relieving the Niagara Falls plant and better serving the foreign trade.

The Iron and Metal Markets

Readjustments Under Way

Output Less and Prices Lower

Car Buying Counted on to Bring Improvement—Bars Share in Weakness

Further reductions in prices of steel products have been made in the past week and a number of mills have found it necessary to shorten their running schedules or to shut down some of their melting and rolling equipment. The operation of steel works blast furnaces is being adjusted to the requirements of the mills, these stoppages including three furnaces at Lackawanna, N. Y., and one at Aliquippa, Pa.

Leaders in the industry have been widely quoted in hopeful reviews of the situation. The halt in buying, the readjustment of prices and some curtailment of output are admitted, but emphasis is laid on the high rate of consumption still maintained under hand-to-mouth buying. The uncomfortable fact is that the falling off in business is progressive. For the country, present steel plant operation is roundly at 80 per cent. of capacity.

Buyers have definitely in mind the course of the market two years ago, and the level at which heavy buying was induced. With the reductions made in the past week prices on heavier products are still several dollars a ton above those of late 1911 and early 1912. Whether there will be free forward buying at intermediate figures is the question to which the trade is now working out the answer.

A 15,000-ton rail order just placed by the Atlantic Coast Line gives needed business to the Ensley mill. The Missouri Pacific has bought 6000 tons from the Pennsylvania Steel Company, and two 2000-ton orders have been given out in the South. The Paulista Railway in Brazil has ordered 3000 tons. An English mill has taken a 15,000-ton order in Argentina at a concession from the $30 price lately maintained in Great Britain.

Car buying has been stimulated in the old-time way and prices are lower than in many months. The Buffalo, Rochester & Pittsburgh has bought 1000 steel hopper cars; the Soo Line, 1100 gondolas and ore cars; the Mobile & Ohio, 522 cars, and the Pennsylvania Railroad, 1000. Estimates of cars on which railroads are figuring go in some cases above 60,000, while inquiries immediately before the car companies are for 6000 to 7000. The Norfolk & Western has bought 10,000 to 12,000 tons of plain material, chiefly for cars it is building.

The expected reduction in lap weld pipe became effective October 28, amounting to about $2 a ton, while the extra to jobbers was increased from 5 per cent. to 5 and 2½ per cent. The new prices bring the market back to those of January 1.

Plate mills now commonly quote 1.30c., Pittsburgh, and there are indications that this is not absolute minimum. The Newport News shipyard has bought 3000 tons, on which an Eastern mill was low bidder. At Pittsburgh 3200 tons of plates and shapes have just been awarded for a new lake freighter.

Steel bar prices, long held firmly, are showing less resistance to the general tendency. In Chicago and Central Western districts iron rolling mills have taken business at the expense of steel bar mills, 1.15c., Chicago, and a shade lower having been done. Cleveland iron bar mills have felt Chicago competition quite keenly. Around Chicago steel bars have sold on a 1.30c., Pittsburgh, basis. Makers of bolts and nuts and rivets are naming lower prices in line with those in bars.

The volume of structural work has not seriously fallen off. In the East about 25,000 tons is represented in jobs considered active, apart from the new subways. For the Lackawanna terminals at Buffalo, originally calling for 6600 tons of steel, revised plans involve a partial use of concrete. The Puget Sound Navy Yard contract, 2500 tons, has been placed, also the viaduct approach to an Ohio River bridge of the Pennsylvania Lines West, 2600 tons.

In the lighter products prices are little changed, though more sheet mills are selling No. 28 black sheets at 2c., Pittsburgh. Wire mills have been accumulating stocks recently and curtailment in that industry has gone farther in the past week.

Foreign finished material is not a market factor as yet, though the declines in European prices, particularly in Germany, are being watched sharply.

Pig iron is weaker and buying is at a low ebb. With most foundry iron furnaces it is now not so much a question of getting more money for 1914 deliveries than for this year's, as of holding recent prices. Lake Erie furnaces have invaded southern Ohio territory at the expense of prices, and the Alabama market is not so firm.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	Oct. 29, 1913.	Oct. 22, 1913.	Sept. 24, 1913.	Oct. 30, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia.	*$15.75*	$16.00	$16.00	$18.00
Foundry No. 2, Valley furnace.	13.75	13.75	14.00	16.25
Foundry No. 2 S'th'n, Cin'ti..	*14.25*	14.50	14.25	17.25
Foundry No. 2, Birmingham, Ala.	*11.00*	11.25	11.00	14.00
Foundry No. 2, furnace, Chicago*	15.00	15.00	15.00	17.50
Basic, delivered, eastern Pa....	15.25	15.25	15.25	18.00
Basic, Valley furnace	13.75	13.75	14.00	16.25
Bessemer, Pittsburgh	*16.40*	16.65	16.65	17.90
Malleable Bessemer, Chicago*..	15.50	15.50	15.00	17.50
Gray forge, Pittsburgh.....	14.30	14.30	14.25	16.40
Lake Superior charcoal, Chicago	15.25	15.25	14.75	18.25
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh....	*22.50*	23.00	24.50	27.00
Open-hearth billets, Pittsburgh..	*22.50*	23.00	24.00	27.50
Open-hearth sheet bars, P'gh..	*23.00*	23.50	25.00	28.00
Forging billets, Pittsburgh	*26.00*	27.00	30.00	34.00
Open-hearth billets, Philadelphia	24.00	24.00	25.00	30.00
Wire rods, Pittsburgh.....	26.50	26.50	27.00	29.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	*13.50*	14.00	14.00	18.00
Iron rails, Philadelphia.....	17.50	17.50	17.50	18.00
Carwheels, Chicago	12.00	12.00	12.25	16.50
Carwheels, Philadelphia	**12.25**	12.00	13.00	15.00
Heavy steel scrap, Pittsburgh..	*11.50*	11.75	12.25	16.25
Heavy steel scrap, Philadelphia	11.00	11.00	11.75	15.50
Heavy steel scrap, Chicago	10.00	10.00	10.00	13.75
No. 1 foundry cast, Pittsburgh..	*12.00*	12.50	12.75	15.00
No. 1 foundry cast, Philadelphia	13.50	13.50	13.00	14.75
No. 1 f'dry cast, Ch'go (net ton)	10.25	10.25	10.50	13.75
Finished Iron and Steel, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.32½	1.32½	1.32½	1.65
Iron bars, Pittsburgh	*1.50*	1.55	1.55	1.55
Iron bars, Chicago	*1.15*	1.25	1.35	1.50
Steel bars, Pittsburgh	*1.35*	1.40	1.40	1.40
Steel bars, New York	*1.51*	1.56	1.56	1.56
Tank plates, Pittsburgh	*1.30*	1.35	1.40	1.60
Tank plates, New York.....	*1.46*	1.51	1.56	1.76
Beams, channels & angles, P'gh.	*1.30*	1.35	1.40	1.45
Beams, channels, angles, N. Y..	*1.46*	1.51	1.56	1.61
Skelp, grooved steel, Pittsburgh	*1.30*	1.35	1.35	1.40
Skelp, sheared steel, Pittsburgh.	*1.35*	1.45	1.45	1.45
Steel hoops, Pittsburgh	*1.50*	1.60	1.60	1.50
Sheets, Nails and Wire, Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh.	*2.00*	2.05	2.10	2.25
Galvanized sheets, No. 28, P'gh.	*3.00*	3.10	3.10	3.40
Wire nails, Pittsburgh.....	1.60	1.60	1.65	1.70
Cut nails, f.o.b. Eastern mills..	1.65	1.65	1.70	1.70
Cut nails, Pittsburgh	1.55	1.55	1.60	1.75
Fence wire, ann'l'd, 0 to 9, P'gh.	1.40	1.40	1.45	1.50
Barb wire, galv., Pittsburgh....	2.00	2.00	2.05	2.10

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	Oct. 29, 1913.	Oct. 22, 1913.	Sept. 24, 1913.	Oct. 30, 1912.
Furnace coke, prompt shipment	$2.00	$2.00	$2.15	$4.00
Furnace coke, future delivery..	2.10	2.10	2.25	3.00
Foundry coke, prompt shipment	2.75	2.75	2.90	4.25
Foundry coke, future delivery..	3.00	3.00	3.00	3.75

Metals,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	*16.87½*	17.00	17.00	17.75
Electrolytic copper, New York.	*16.62½*	16.75	16.75	17.37½
Spelter, St. Louis.....	**5.30**	5.20	5.65	7.35
Spelter, New York	**5.45**	5.35	5.80	7.50
Lead, St. Louis	4.20	4.20	4.60	4.85
Lead, New York	4.35	4.35	4.75	5.00
Tin, New York	*40.10*	40.35	41.85	50.00
Antimony, Hallett's, New York..	**7.25**	7.12½	7.75	9.75
Tin plate, 100-lb. box, Pittsburgh	3.50	3.50	3.50	3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier, 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.30c. to 1.35c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.30c. to 1.35c.. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck, and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $26.50. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40 to $1.45; galvanized, $1.80 to $1.85. Galvanized barb wire, to jobbers, $2 to $2.05; painted, $1.60 to $1.65. Wire nails, to jobbers, $1.60 to $1.65.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.60	$1.65	$1.70	$1.75	$1.85	$1.95	$2.05	$2.15
Galvanized	2.05	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on butt weld steel pipe (full weight), in effect from August 8, 1913, lap weld (full weight), from October 28, 1913, and iron pipe (full weight), from June 2, 1913:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜.....	73	52½	⅛ and ¼	66	47
½	77	66½	⅜	65	46
¾ to 3.....	80	71½	½	69	56
			¾ to 2½	72	61
Lap Weld.					
2	77	68½	1¼	56	45
2½ to 6	79	70½	1½	67	56
7 to 12	76	65½	2	68	58
13 to 15	53	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55
Reamed and Drifted.					
1 to 3, butt.....	78	69½	1 to 1½, butt.....	70	59
2, lap	75	66½	2, butt	70	59
2½ to 6, lap	77	68½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap.....	68	59
Butt Weld, extra strong, plain ends					
⅛, ¼ and ⅜.....	68	57½	⅛	63	52
½	73	66½	¼	67	60
¾ to 1½.....	77	70½	¾ to 1½	71	62
2 to 3	75	71½	2 and 2½	72	63
Lap Weld, extra strong, plain ends.					
2	74	65½	1½	65	59
2½ to 4	76	67½	2	66	58
4½ to 6	75	66½	2½ to 4	70	61
7 to 8	68	57½	4½ to 6	69	60
9 to 12.....	63	52½	7 and 8	63	53
			9 to 12	58	47
Butt Weld, double extra strong, plain ends.					
½	63	56½	½	57	49
¾ to 1½	66	59½	¾ to 1½	60	52
2 to 2½	68	61½	2 and 2½	62	54
Lap Weld, double extra strong, plain ends.					
2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4	60	54
4½ to 6	65	58½	4½ to 6.....	59	53
7 to 8	58	47½	7 to 8	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¾ and 2 in.....	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.....	48
2½ and 2¾ in.....	63	2¼ in.	44
3 and 3¼ in.....	67	2½ to 2¾ in.....	53
3½ to 4½ in.....	69	3 and 3¼ in.....	55
5 and 6 in.....	63	3½ to 4½ in.....	58
7 to 13 in.....	60		

Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.45 to 1.50
Nos. 9 and 10	1.50 to 1.55
Nos. 11 and 12	1.55 to 1.65
Nos. 13 and 14	1.60 to 1.70
Nos. 15 and 16	1.70 to 1.75
Box Annealed Sheets, Cold Rolled.	
Nos. 10 and 11	1.65 to 1.75
No. 12	1.65 to 1.75
Nos. 13 and 14	1.70 to 1.80
Nos. 15 and 16	1.75 to 1.85
Nos. 17 to 21	1.80 to 1.90
Nos. 22 and 24	1.85 to 1.95
Nos. 25 and 26	1.90 to 2.00
No. 27	1.95 to 2.05
No. 28	2.00 to 2.10
No. 29	2.05 to 2.15
No. 30	2.15 to 2.20
Galvanized Sheets of Black Sheet Gauge.	
Nos. 10 and 11	2.00 to 2.10
No. 12	2.10 to 2.20
Nos. 13 and 14	2.10 to 2.20
Nos. 15 and 16	2.25 to 2.35
Nos. 17 to 21	2.40 to 2.50
Nos. 22 and 24	2.55 to 2.65
Nos. 25 and 26	2.70 to 2.80
No. 27	2.85 to 2.95
No. 28	3.00 to 3.10
No. 29	3.15 to 3.25
No. 30	3.30 to 3.40

Pittsburgh

PITTSBURGH, PA., October 29, 1913.

Prices on nearly all kinds of semi-finished and finished materials are steadily declining. During the week lap-weld steel pipe has been reduced one point, or $2 a ton, while billets and sheet bars are off about 50c. a ton, plates and shapes $1 to $2, skelp $1, steel bars $1, sheets about $1, nuts and bolts 10 per cent., hoops and bands about $2, and there is nothing in sight as yet to indicate that bottom has been reached. Bessemer and open-hearth billets are freely offered at $22.50 and sheet bars at $23, maker's mill, and even these prices can be shaded. The weakness in prices has also extended to pig iron. New business is light, and could not be otherwise under a steadily declining market. The rate of operations is being reduced to some extent in this district. All superfluous labor is being laid off as fast as possible.

Pig Iron.—No sales of large tonnage are being made, and the local market is practically bare of new inquiry. Several small sales of Bessemer, amounting to possibly 350 tons, have been made at about $15.50, Valley furnace, but if any large tonnage was wanted this price would be shaded. Not enough pig iron is being bought to test the market. No. 3 furnace of the Jones & Laughlin Steel Company at Aliquippa, Pa., has gone out of blast. We quote: Bessemer, nominally, $15.50; basic, $13.75; No. 2 foundry, $13.75 to $14; malleable Bessemer, $14.25; gray forge, $13.40, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Prices are steadily declining, and this probably explains why new sales are so few, as consumers are evidently afraid to place orders ahead. Reports are going of very low prices being made on billets and sheet bars, but most of these are probably incorrect. If a buyer came in the market for a large tonnage of billets or sheet bars for delivery this year, he could no doubt shade quoted prices. We quote open-hearth and Bessemer billets for prompt delivery and for shipment over remainder of the year at $22.50 and Bessemer or open-hearth sheet bars at $23, makers' mill, Pittsburgh or Youngstown. Prices on forging and axle billets have materially declined. We quote forging billets at $26 and axle billets at about $23 at maker's mill.

Steel Rails.—No important orders for standard sections are being placed, but there are still a good many small orders, ranging from 100 tons up to 500 tons, being given out for delivery this year. The new demand for light rails continues active, the Carnegie Steel Company having received new orders and specifications in the past week for over 3000 tons. Heavy rails are about the only item on the list on which prices have not declined, but the rerolling rail mills are naming prices on light rails about $2 a ton less than are quoted on rails rolled from billets. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Muck Bar.—While muck bar is scarce, due to the shutdown for some months of puddling plants in the Pittsburgh and Youngstown districts, yet there is little inquiry, and no sales have been reported in this market for some time. We quote best grades of muck bar made from all pig iron at nominally $32, Pittsburgh, while Eastern bar is still being offered here at about $2 a ton less.

Plates.—The Carnegie Steel Company will furnish about 3200 tons of plates and shapes for a new freighter to be built by the American Shipbuilding Company. Reports of large inquiries for cars cannot be verified, and local steel car companies say they have not been asked to bid on many of these reported inquiries. The J. B. Jenkins Coal & Coke Company, Elkins, W. Va., is in the market for 400 50-ton steel hopper cars. The report that the Baltimore & Ohio had placed 1000 steel hoppers with the Cambria Steel Company is not new, as the order was placed several months ago. Prices on plates are weak. Mills are now quoting 1.30c., but on very desirable tonnage a lower price could be named.

Structural Material.—The Fort Pitt Bridge Works of this city is the low bidder on about 6600 tons for the Buffalo terminals of the Delaware, Lackawanna & Western Railroad, but it is now announced that the plans are being revised, and a good deal of concrete work will be used in place of steel. The American Bridge Company has taken a viaduct approach for the Woods Run end of the Ohio River connecting bridge of the Pennsylvania Lines West in this city, about 2600 tons. It will be a two-track viaduct, and this order makes a total of about 17,000 tons of structural material which the American Bridge Company has furnished for this structure in the past six months. New inquiry is light. We quote beams and channels up to 15-in. at 1.30c. to 1.35c.

Wire Rods.—The new demand is quiet and specifications are only fair. We quote Bessemer, open-hearth and chain rods at $26.50, Pittsburgh, but this price would be shaded if any large business was in the market.

Ferroalloys.—A Canton, Ohio, consumer is reported to have closed for 150 tons of English ferromanganese for forward delivery at $50, seaboard, and declined to take German at 50c. a ton less. New inquiry is light, most consumers being covered for this year. We quote 80 per cent. foreign ferromanganese at $50, Baltimore, the freight rate to the Pittsburgh district being $2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. ferrosilicon at $22; 11 per cent., $23, and 12 per cent., $24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12c. in lots up to 2000 lb.

Skelp.—No new sales are reported, and inquiry is light. We have reduced prices on both iron and steel skelp $1 a ton, and on a firm inquiry for a large tonnage even lower figures might be named. We quote grooved steel skelp at 1.30c.; sheared steel skelp, 1.35c.; grooved iron skelp, 1.55c., and sheared iron skelp, 1.60c., delivered to buyers' mills in Pittsburgh district.

Iron and Steel Bars.—For several months prices on steel bars have been firmer than on any other line of finished products, but with the falling off in new demand and specifications prices have yielded slightly, and we reduce our quotation on steel bars to 1.35c. It is a notable fact that steel bars are still $1 a ton higher than prices being quoted on plates and shapes, bars having usually been $1, and sometimes $2 a ton, less in price. Makers of steel bars report that the new demand is only for small lots to cover current needs. The steel bar mills still have a large amount of business on their books for delivery up to the end of the year. Conditions in the bar-iron trade are unsatisfactory, the demand being dull and prices weak. We quote steel bars for prompt or forward delivery at 1.35c. and iron bars at 1.50c., but the latter price would be shaded on any desirable orders. Local warehouses are charging about 1.85c. on small lots of steel bars for spot delivery.

Sheets.—A local sheet maker has recently had a quotation from England on galvanized sheets, and found that No. 24 gauge, which is the standard in England, as against our No. 28, cannot be laid down in New York under about 3c., without cost of insurance or dockage. Domestic No. 24 galvanized can be laid down in New York at about 2.73c., based on 2.55c., Pittsburgh, plus 18c. freight per 100 lb. In addition, the English manufacturers charge $2.50 a ton for crating, and foreign sheets could not be safely shipped to this country without being crated. It seems practically certain, therefore, that while present conditions last the domestic makers of black and galvanized sheets have nothing to fear from competition from the other side. The new demand for sheets is only fair, but a number of large consumers are trying hard to get the mills to accept contracts for delivery over the first half of next year on the basis of about 2c. for No. 28 black and 3c. for No. 28 galvanized. The mills are refusing to accept these offers, but would sell at these prices for delivery this year only. The market on No. 28 Bessemer black sheets seems to have settled down to about 2c. for carload and larger lots, and on No. 28 galvanized to 3c. Operations among sheet mills are being steadily curtailed, and at present are not over 65 per cent., although two or three mills are running to greater capacity. We quote Nos. 9 and 10 blue annealed sheets at 1.50c. to 1.55c.; No. 28 Bessemer black, 2.05c. to 2.10c.; No. 28 galvanized, 3.10c. to 3.15c.; No. 28 tin mill black plate, H.R. and A., 2.05c., and Nos. 29 and 30, 2.10c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Conditions in this trade show no material change. New demand is dull, as it is between seasons, and specifications from large consumers have been

pretty well cleaned up, so that shipments by the mills are much lighter now than at any time this year. As yet no price has been fixed on contracts for winter and spring delivery, and neither the mills nor consumers are agitating this question. Operations among the mills continue to be curtailed and they are not running to an average of more than 65 per cent. A number of the larger makers are running to practically full capacity up to Friday morning each week, and then close down for the remainder of the week. A good part of the output of the mills at present is going into stock to be shipped out later on contracts for forward delivery. On the small amount of new business that is being placed 100 lb. cokes are being held at about $3.50 and 100 lb. ternes at $3.45 per base box, f.o.b. Pittsburgh.

Railroad Spikes.—Very little new business is being placed, and only in small orders, none of the railroads specifying against contracts, and all of the spike mills report conditions very dull. Prices are weak, and spikes are being sold in the Chicago market on the basis of about $1.50, Pittsburgh, but the price for local delivery is higher. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.55 and small railroad and boat spikes in carloads at $1.70 per 100 lb., f.o.b., Pittsburgh.

Bolts and Rivets.—The shading in prices on bolts and rivets which has been going on for some time has resulted in a reduction in prices through a higher discount list on nuts and bolts which went into effect last week. The new demand is fair, but is mostly for small lots, jobbers and consumers holding off placing large orders owing to unsettled conditions in the market. The new demand for rivets is also dull, and is only for small lots to meet current needs. We quote button head structural rivets $1.80 to $1.85 in large lots and $1.90 to $1.95 in small lots, and cone head boiler rivets at $1.90 to $1.95 in large lots and $2 to $2.05 in small lots. Terms 30 days net, less 2 per cent. for cash in 10 days. The new discounts on nuts and bolts adopted last week are as follows: In lots of 300 lb. or over, delivered with a 20c. freight radius of makers' works:

Coach and lag screws	80 and 20% off
Small carriage bolts, cut threads	75 and 17½% off
Small carriage bolts, rolled threads	80 and 2½% off
Large carriage bolts	70 and 15% off
Small machine bolts, cut threads	80 and 2½% off
Small machine bolts, rolled threads	80 and 7½% off
Large machine bolts	75 and 10 and 2½% off
Machine bolts, with C.P.C. and T nuts, small,	70 and 12½% off
Machine bolts with C.P.C. and T nuts, large,	70 and 12½% off
Square hot pressed nuts, blanked and tapped	$6.00 off list
Hexagon nuts	$6.70 off list
C.P.C. and R square nuts, tapped and blanked	$5.80 off list
Hexagon nuts, ⅝ and larger	$6.80 off list
Hexagon nuts, smaller than 9/16	$7.40 off list
C.P. plain square nuts	$5.30 off list
C.P. plain hexagon nuts	$5.70 off list
Semi-finished hexagon nuts, ⅝ and larger	85 and 10% off
Semi-finished hex. nuts, smaller than 9/16	85, 10 and 5% off
Rivets, 7/16 x 6½, smaller and shorter	80 and 10% off
Rivets, metallic tinned, bulk	80 and 10% off
Rivets, tin plated, bulk	80 and 10% off
Rivets, metallic tinned, packages	80 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Shafting.—Several makers report that specifications in the past week against contracts for shafting have been a little better, but the new demand is still very dull, and only for small lots to meet current needs. Prices continue weak, and we quote cold rolled shafting at 62 to 63 per cent. off list in carloads and larger lots, and 55 to 60 per cent. off in small lots, delivered in base territory.

Hoops and Bands.—The new demand for both hoops and bands is dull, and prices are lower. We quote bands at 1.35c., extras as per the steel bar card, and steel hoops at 1.50c. to 1.60c., Pittsburgh.

Wire Products.—Makers of wire products state that since wire nails settled down to $1.60 and plain annealed wire to $1.40, there is more stability in the market and less talk is being heard of cutting in prices. The new demand for wire and wire nails is quiet, and only for small lots to cover current needs, while specifications against contracts are coming in at a fair rate. It is stated that specifications in the past week for wire nails have been heavier than for some time. We quote wire nails to jobbers $1.60; cut nails, $1.60; plain annealed wire, $1.40; galvanized barb wire, $2, and painted barb wire, $1.60 f.o.b., Pittsburgh, per 100 lb., usual terms, actual freights added to points of delivery.

Merchant Steel.—New demand continues dull and only for small lots to meet current wants, while specifications are only for such quantities of material as jobbers or consumers actually need. Prices are weak and if any desirable business were offering would be materially shaded. General asking prices, which, however, do not represent minimum of the market are about as follows: Iron-finished tire, 1½ x ½ in. and larger, 1.35c., base; under 1½ x ½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to ⅞ and 1 in., 1.85c. to 1.95c.; 1⅛ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—Several of the pipe mills report that new demand is holding up remarkably well considering the general unsettled condition of the steel business, one or two leading mills stating that actual orders entered so far in October have been heavier than in September or August. Effective Tuesday, October 28, the National Tube Company announced a reduction in prices, increasing discounts on lap-weld steel pipe of one point, netting a reduction of $2 a ton. It increased the extra allowed jobbers from 5 per cent. to 5 and 2½ per cent., and the new discounts on steel pipe are the same as those in effect January this year. There has been some slowing down in operations among some of the pipe mills but not to any considerable extent. No large orders for line pipe have lately been placed, and none is in the market. The correct discounts now in effect on butt and lap-weld iron and steel pipe will be found on page 991. The new demand for oil country goods continues active, drillers desiring to get as much work done as possible before the weather breaks. Prices on oil country goods continue to be shaded.

Boiler Tubes.—The new demand is reported by several mills to be slightly better, but as a rule consumers and jobbers are still buying only such quantities of boiler tubes as are needed for current wants. Discounts are still being more or less shaded depending on the order.

Old Material.—A leading consumer of scrap located east of Pittsburgh has bought in the past week 15,000 to 20,000 tons or more of selected heavy steel scrap at prices ranging from $11.90 to $12.25 delivered. This consuming point takes a slightly higher freight rate than consuming points in the Pittsburfh district. This same interest is expected to buy this week an additional tonnage of heavy scrap now under negotiation. We also note sales of 2000 tons or more of selected heavy steel scrap at about $11.75 delivered to consuming points in the Pittsburgh district. Prices on all grades are very weak and have gone off further from 25 to 50 cents a ton. Sales of about 200 tons of No. 1 cast scrap have been made at $12 delivered. We have again revised prices to a lower basis, and dealers are now quoting about as follows per gross ton for delivery in the Pittsburgh and other districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$11.75 to $12.00
Ordinary steel scrap	11.50 to 11.75
Compressed side and end sheet scrap	10.25
No. 1 foundry cast	12.00 to 12.25
No. 2 foundry cast	10.75 to 11.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	7.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock	11.25 to 11.50
Grate bars	8.00 to 8.25
Low phosphorus melting stock	15.00 to 15.25
Iron car axles	24.25 to 24.75
Steel car axles	17.25 to 17.50
Locomotive axles, steel	20.75 to 21.25
Locomotive axles, iron	25.25 to 25.75
No. 1 busheling scrap	11.50
No. 2 busheling scrap	7.00
*Machine shop turnings	6.75
Old carwheels	13.50 to 13.75
*Cast-iron borings	7.75 to 8.00
†Sheet bar crop ends	13.75 to 14.00
Old iron rails	14.25 to 14.50
No. 1 railroad wrought scrap	13.50 to 13.75
Heavy steel axle turnings	8.75 to 9.00
Stove plate	8.00 to 8.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—The coke trade continues extremely dull, with a gradual settling down in prices on standard furnace coke to about $2 per net ton at oven. Some coke makers are said to be overshipping on their contracts in an effort to keep coke from accumulating in the yards. Some well-known brands of furnace coke are held at $2.10 to $2.15. There would be no trouble in making contracts for standard grade furnace coke

for next year on the basis of $2.25 per net ton at oven, but none of the furnaces is showing any desire to make such contracts at this time. There is no large inquiry, and sales for prompt shipment are light and only for small lots. Unless present conditions show material betterment in the near future, it is the general expectation that standard grades of furnace coke on contracts for first half of next year will not be above $2. There is not much new demand for foundry coke, but prices are fairly strong. We quote standard grades of furnace coke for delivery over remainder of the year at $2 to $2.15 per net ton at oven, according to the maker. We quote standard grades of 72-hr. foundry coke at $2.75 to $2.90 per net ton at oven. The Connellsville, Pa., Courier reports output of coke in the Upper and Lower Connellsville regions last week as being 379,605 tons, a decrease over the previous week of over 7000 tons.

Chicago

CHICAGO, ILL., October 27, 1913.

In the past week there have emanated from Chicago opinions from high sources concerning the present business situation. The meeting of the American Iron and Steel Institute brought more steel manufacturers to Chicago than have ever been here at one time. The present lack of orders is frankly acknowledged, and more might have been conceded regarding the decline in prices without sacrifice of accuracy. Both buyers and sellers are waiting, while the general market is slowly working around to the buyer's advantage. Consumers are withholding specifications, particularly the implement and railroad interests, for the appearance of the lower level of prices which they argue must come before any upward tendency of the market can materialize. On the other hand producers of steel are seeking to avoid a general readjustment of prices, if that shall be necessary, in advance of the time when the large buyers will be able to place good-sized orders. It is thought by some that the tonnage now coming to the books in the quiet buying of cars and other equipment may fortify the mills so that the concessions now made to induce these purchases will not be required to stimulate the general market. Against this view the current trend of the market argues strongly. In this territory sales of moderate amounts of plates to good customers have been made on the basis of 1.30c. Pittsburgh; of structural shapes at 1.35c.; of bars in some instances at prices $2 below the regular quotation of 1.58c. Chicago; of black sheets at 2.18c. Chicago, and of iron bars at various prices from 1.15c. up. In special cases the above prices do not cover concessions that have been made. On the other hand encouragement is obtained from increased business in some lines. New orders for pig iron are decidedly scarce. Northern furnaces in blast have ample business on which to run until the first of the year and in the South there is a scarcity of high grade iron.

Pig Iron.—Of the various reasons for the present lack of interest in pig iron, two are especially prominent. Most of the consumers in this territory have provided for their wants in the remainder of the year except for occasional hand-to-mouth purchases. On the other hand the absence of contracting for the first half, a beginning of which is ordinarily seen at this time of the year, reflects the belief that nothing above current prices will obtain for next year's business a little later. Very little inquiry for either Northern or Southern iron is noted. The generally quoted price for Lake iron is $15 at the furnace, and for Southern iron $11.50 f.o.b. Birmingham. The limited supply of Southern iron running 2.25 per cent. and over in silicon is mentioned. Selling of charcoal iron in the vicinity of Chicago continues active and at prices which compete directly with coke iron. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.25 to $15.75
Northern coke foundry, No. 1	15.50 to 16.00
Northern coke foundry, No. 2	15.00 to 15.50
Northern coke foundry, No. 3	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft	16.35 to 16.85
Southern coke, No. 2 foundry and No. 2 soft	15.85 to 16.35
Southern coke, No. 3	15.35 to 15.85
Southern coke, No. 4	14.85 to 15.35
Southern gray forge	14.85 to 15.35
Southern mottled	14.35 to 14.85
Malleable Bessemer	15.00 to 15.50
Standard Bessemer	18.40
Basic	15.00 to 15.50
Jackson Co. and Kentucky silvery, 6 per cent.	18.40
Jackson Co. and Kentucky silvery, 8 per cent.	19.40
Jackson Co. and Kentucky silvery, 10 per cent.	20.40

Rails and Track Supplies.—The railroads appear less hesitant in their buying of track fastenings than with regard to rail purchases and in the past ten days a number of orders have been placed. The Chicago, Burlington & Quincy is also about to close for its requirements. In keeping with declines in the heavier forms of material from which bolts and spikes are made lower prices are prevailing for fastenings. The only rail purchase reported in this market is 6000 tons by the Missouri Pacific from the Pennsylvania Steel Company for winter shipment. We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.15c. to 2.20c., base, all in carload lots, Chicago; tie plates, $30 to $32, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Lower quotations for structural shapes were reported in this territory in the past week. This is the result of the general market situation rather than any particular pressure on structural material itself, the demand for which is very light. A number of small contracts for fabricated steel were placed during the week including a Natatorium building, St. Louis, and the Mercantile building in the same city, both going to the Banner Iron Works. The South Halsted Street Iron Works will furnish 315 tons for an office building for the Chicago & Eastern Illinois Railway Company at Chicago; A. Bolter's Sons, 275 tons for the O. W. Richardson building, Chicago; the Minneapolis Steel & Machinery Company, the steel for a school building at Sandy, Utah. Two buildings for Heywood Bros. & Wakefield Company at Chicago, for which 2200 tons of steel was figured, are to be erected of reinforced concrete. The 500 cars for which the Southern Railway (Mobile & Ohio) was in the market are understood to have been placed with the Pressed Steel Car Company. The Soo Line also bought 500 box cars. For Chicago delivery from mill we quote plain structural shapes 1.53c. to 1.58c.

The general situation as regards store business has not changed materially. As compared with previous periods of market dullness, store business is reported to be heavy. This is attributed to the extension of the trade from jobbers' stocks that dates from the recent period of slow mill deliveries. Business now being placed with the jobbers appears to be derived from that source for other reasons than price and no revisions of store quotations have been made as yet. We continue to quote for Chicago delivery out of store for structural material 1.95c.

Plates.—Active sales campaigns by the makers of plates are resulting in a fair tonnage made up of scattering orders. The tonnage, however, is of less consequence than the extent of the concessions necessary to secure business. Tank plate orders of moderate size have been placed in this market at the equivalent of 1.30c. Pittsburgh, but this is still a fair price for Western mills. At Riverside, Cal., quotations are being asked on 60 miles of riveted steel pipe for a municipal water system. An order for 400 tons of special plates for car underframes was placed. For Chicago delivery, mill shipment, we quote 1.48c. to 1.53c.

The demand for plates out of store, while light, totals a fair volume in number of orders. Prices are unchanged and we quote for Chicago delivery 1.95c.

Sheets.—Close buyers of black sheets have forced prices down to a still lower level and 2.18c. Chicago has been done for No. 28 gauge. The volume of business appears to be decreasing. The local independent mill is still securing sufficient business to demand the conversion of all its raw steel available, but under recently changed operating conditions is not yet securing its maximum production of crude steel. Galvanized sheets have maintained their position in the market more firmly than black sheets. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.73c. to 1.78c.; No. 28 black, 2.18c. to 2.23c.; No. 28 galvanized, 3.23c.

Out of store the business in sheets continues very light. We quote without change as follows: No. 10 blue annealed, 2.15c.; No. 28 black, 2.75c.; No. 28 galvanized, 3.80c.

Bars.—Current business in steel bars appears to consist of new orders rather than specifications against contracts. This is particularly true of the specifications from the agricultural implement interests which are loathe to specify any more on the 1.40c. basis than is necessary. It is known that in various instances unspecified portions of contracts expiring July 1 were carried into the last half through the inability of the

mills to deliver according to schedule. Their own business being light, it is the evident expectation of these interests to stretch out their 1.15c. tonnage until something approaching that price is again available. Hard steel bars are in fair demand and prices are not materially reduced. For the Heywood Bros. & Wakefield Company's buildings, the Corrugated Bar Company will furnish 680 tons of reinforcing bars. Bar iron prices show increasing weakness. The top of the market at Chicago is now 1.20c. and 1.15c. has been done in several instances. A price even lower than this is reported on excellent authority. We quote for mill shipment as follows: Bar iron, 1.15c. to 1.20c., soft steel bars, 1.48c. to 1.58c.; hard steel bars, 1.40c. to 1.50c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

For delivery from store we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—Indicative of the lower level of prices to which it has been necessary to drop in order to secure the little business offering in bolts, we have revised our discounts and now quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-2½; cut thread, 75-17½; larger sizes, 70-15; machine bolts up to ⅜ x 4 in., rolled thread, 80-7½; cut thread, 80-2½; large size, 75-2½; coach screws, 80-10-10; hot pressed nuts, square head, $6 off per cwt.; hexagon, $6.70 off per cwt. Structural rivets, ¾ to 1¼ in., 1.98c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-5-10; larger sizes, 70-7½; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-7½ off. Hot pressed nuts, square head, $5.50, and hexagon, $6.20 off per cwt.

Wire Products.—Although one of the independent makers of wire products reports one of the heaviest weeks in point of tonnage for some time, the reduction of $1 a ton from recently quoted prices is now general. Prevailing prices for plain wire and wire nails in this territory are equivalent to a 1.60c. basis at Pittsburgh for wire nails. The general run of business is light. Prices to jobbers are as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.70; painted barb wire, $1.78; galvanized, $2.15; polished staples, $1.78; galvanized, $2.10, all Chicago.

Old Material.—Melters of scrap continue to limit their purchases. Even the approach of winter, at which time there is ordinarily a disposition to increase stocks, has this year brought no improvement. In fact, even lower prices obtain on a number of grades. The situation will not be improved by reason of the railroad scrap being offered this week. Current lists including a heavy offering from the Baltimore & Ohio Railroad, in which are 2100 tons of wrought scrap, 3000 tons of steel rails, and 1000 tons of car wheels. The Chicago, Rock Island & Pacific is selling 3300 tons, not including about 250 tons of car wheels. The Grand Trunk Railway has 300 tons and the Standard Oil Company about 400 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$13.50 to $14.00
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.00 to 12.50
Heavy melting steel scrap	10.00 to 10.50
Frogs, switches and guards, cut apart	10.00 to 10.50
Shoveling steel	9.00 to 9.50
Steel axle turnings	7.25 to 7.75

Per Net Ton.

Iron angles and splice bars	$13.25 to $13.75
Iron arch bars and transoms	12.75 to 13.25
Steel angle bars	9.00 to 9.50
Iron car axles	20.00 to 20.50
Steel car axles	13.75 to 14.25
No. 1 railroad wrought	9.25 to 9.75
No. 2 railroad wrought	8.50 to 9.00
Cut forge	8.50 to 9.00
Steel knuckles and couplers	9.25 to 9.75
Steel springs	9.75 to 10.25
Locomotive tires, smooth	10.75 to 11.25
Machine shop turnings	4.50 to 4.75
Cast borings	4.50 to 5.00
No. 1 busheling	7.75 to 8.25
No. 2 busheling	6.25 to 6.75
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	10.25 to 10.75
No. 1 cast scrap	10.25 to 10.75
Stove plate and light cast scrap	9.25 to 9.75
Railroad malleable	9.50 to 10.00
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.25 to 7.50

Philadelphia

PHILADELPHIA, PA., October 28, 1913.

Light railroad buying is still the complaint of makers of finished iron and steel products, although encouragement is taken from prospective car buying. Prices are yielding under large inquiries from other consumers, and it is believed that a level at which good buying may result is not far distant. Business in pig iron has been along narrow lines. Consumers take small lots for early delivery but continue to await developments before entering the market for next year's requirements. The old material market remains quiet. Moderate sales of coke have been made for early shipment.

Iron Ore.—Importations during the week ended October 25 included 5931 tons of Swedish, 7500 tons of Newfoundland and 11,700 tons of Cuban ore. New business is at a standstill.

Pig Iron.—The market continues to drag. The fact that producers are pretty well sold ahead for the remainder of the year and that deliveries on contracts are not only being taken freely, but in many cases being urged, sustains what would otherwise be a weak market. There is almost an entire absence of any forward inquiry, consumers figuring that prices are unlikely to advance. The only business of any size closed recently was a lot of 1000 tons of low silicon foundry, for the Baldwin Locomotive Works, for delivery this year. The large majority of the sales in foundry grades has been confined to small lots, few exceeding 50 tons. In instances $15 at furnace has been done, which would be equal to $15.80 to $15.85 delivered here. On less desirable brands reports are heard that $15.75 delivered has been named. Virginia foundry iron has not been in active demand. A sale of 500 tons of coke malleable iron to a local buyer is reported. Odd-lot sales of low-grade iron continue to be made to cast-iron pipe makers at prices ranging from $15 to $15.25 delivered. Some of the large pipe makers would, however, take on round lots if their ideas as to prices were met. Little is heard of the probability of foreign pig iron being brought in on the present basis of prices. Small sales of rolling mill forge iron have been made at an unchanged price. There has been very little movement in the steel-making grades of iron. Basic is dull. Small sales of standard analysis low phosphorus are being made at the recently quoted prices. Current demand in all grades is light, the most important inquiry being for 1500 tons of No. 2X foundry from a foundry up the State. For delivery in buyers' yards in this district, during the remainder of the year, standard brands are quoted as follows:

Eastern Pennsylvania No. 2 X foundry	$15.75 to $16.25
Eastern Pennsylvania No. 2 plain	15.50 to 16.00
Virginia No. 2 X foundry	15.80 to 16.25
Virginia No. 2 plain	15.75 to 16.00
Gray forge	15.00 to 15.25
Basic	15.25 to 15.50
Standard low phosphorus	23.00 to 23.50

Ferroalloys.—Buying has been light. Eighty per cent. ferromanganese has been sold in carload lots, and occasionally a 100-ton order is taken, but there has been no demand for forward delivery. Quotations for prompt German ferromapganese range from $49 to $49.50, seaboard while English ferromanganese is held at $50. Importations last week were confined to English, of which 143 tons was received. Ferrosilicon has been comparatively quiet.

Billets.—New business has been scarce. Current sales have been in small lots, for which $25 delivered represents the market for basic open-hearth rolling billets. Specifications on contracts, while not as heavy as a month ago, have been fairly good and Eastern mills maintain recent production rates. Prices are easy, and any reasonable inquiry for rolling steel would bring out a quotation of $24 delivered here. Forging billets have not been in active demand and are nominally quoted at $30 for ordinary analysis steel.

Plates.—While new business is rather spotty, one pending contract for about 3000 tons of ship plates was closed by a Coatesville mill. The absence of railroad buying is being severely felt by plate makers. The current demand has been closely confined to small lots and some mills are particularly in need of business for their universal mills. Prices have been gradually becoming easier and quotations for current business, delivered in this district, range from 1.50c. to 1.55c., although it is strongly intimated that on sharply competitive business as low as 1.45c. delivered, has been done.

Structural Material.—Little new businss is offered in this vicinity that will run into any large amount of material. The Norfolk & Western Railway is reported to have placed orders in the West against its recent inquiries for car material. Several building projects in this district, which have been up from time to time, are being refigured. Several small bridges are also being estimated on. Prices of plain shapes are easy. On current miscellaneous business 1.50c. to 1.55c., delivered in this district, represents the market, but on desirable tonnages it is reported that some makers would make concessions of $1 a ton.

Sheets.—The volume of business coming to the mills has been smaller and the market is irregular. Sales are mainly in small prompt lots for early shipment, consumers showing little interest in buying for forward account. Prices, while unchanged are weak, Western No. 10 blue annealed sheets being quoted at 1.75c. delivered here. Eastern mills usually meet Western prices.

Bars.—Business has been along narrow lines, consumers taking current requirements, which are usually small, and give little attention to forward needs. Prices have an easier tendency, but mills are not forcing business. For ordinary iron bars quotations for current small lots range from 1.32½c. to 1.37½c. delivered. Steel bars, while not in active demand, are comparatively firm at 1.55c. here.

Coke.—Prompt furnace coke, for immediate and near future delivery, continues to be quoted, for standard brands, at prices ranging from $2.05 to $2.25 at oven. Forward contract coke remains firm at $2.50, without sales. The movement in prompt coke is not heavy. Moderate sales of foundry coke are made at a range from $3 to $3.25, mostly for near future shipment. The following range of prices, per net ton, delivered in buyers' yards in this vicinity, is named:

Connellsville furnace coke	$4.05 to $4.40
Connellsvile foundry coke	4.90 to 5.35
Mountain furnace coke	3.85 to 4.10
Mountain foundry coke	4.60 to 4.85

Old Materials.—The demand could scarcely be quieter. Mills show almost no interest in the market, being fairly well supplied for near future needs. The movement in heavy melting steel scrap has been entirely between dealers. Rolling mill grades are practically at a standstill. Small lots of carwheels have been sold up to $12.75. Little interest is being shown in specialties. Both buyers and sellers are following a waiting policy. Quotations are largely nominal. The following range is named at which business might be done, for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$11.00
Old steel rails, rerolling (nominal)	$14.00 to 14.50
Low phosphorus heavy melting steel scrap (nominal)	16.00
Old steel axles	17.50 to 18.00
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	12.25 to 12.75
No. 1 railroad wrought	13.50 to 14.00
Wrought-iron pipe	10.75 to 11.00
No. 1 forge fire	9.00 to 9.50
No. 2 light iron (nominal)	6.00
No. 2 busheling (nominal)	8.00 to 8.25
Wrought turnings	7.75 to 8.00
Cast borings	7.75 to 8.00
Machinery cast	13.50 to 14.00
Grate bars, railroad	9.00 to 9.50
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	11.00 to 11.50

Cleveland

CLEVELAND, OHIO, October 28, 1913.

Iron Ore.—Ore shipment for the season to November 1 will be approximately 46,000,000 tons. The October movement is expected to be lighter than in the corresponding month of 1912, when shipments aggregated 7,010,219 tons. The weather has been unusually cold in the ore ranges this past week and shipments have been delayed considerably because of frozen ore. Several shippers are planning to send down their last cargoes by November 15, but others will continue shipments up to December 1. However, the November movement will be light, as little ore will be brought down the last half of the month. The Pittsburgh Steamship Company has sent its last barges up the lakes and they will be laid up within a few days. Because of the light late-in-the-season movement, Lake shipments for the season will probably fall short of the expected 50,000,000 tons. However, including the rail shipments, the total from the Lake Superior district will probably reach 50,000,000 tons. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—The market continues lifeless. Some producers are beginning to show an anxiety to take on tonnage for delivery after the first of the year, but others feel that with the present low prices they might as well wait. Prices are now so near the cost of production that they do not believe they will go lower. Prices are weak, but quotations are unchanged. No. 2 foundry is quoted at $13.75 to $14, Valley furnace, and the same quotation is being made in Cleveland for outside shipment. In spite of the easing up of the foundry business, shipments are holding up well and producers generally are shipping all the iron they are making. Jobbing foundries making small light gray castings appear to be about as busy as ever. Steel-making iron is quiet. However, one inquiry for round lot of basic iron is pending. For prompt shipment and for the last quarter we quote, delivered, Cleveland, as follows:

Pessemer	$16.65
Basic	14.90
Northern No. 2 foundry	$14.65 to 14.90
Southern No. 2 foundry	15.35 to 15.85
Gray forge	14.25
Jackson County silvery, 8 per cent. silicon	18.55 to 19.05

Coke.—The market is dull and prices are weak. Sales of foundry grades are being made in small lots for prompt shipment. We quote Standard Connellsville coke at $2 to $2.15 per net ton at oven and Connellsville foundry coke at $2.75 to $3.

Finished Iron and Steel.—Manufacturers are reducing stocks as rapidly as possible and are buying only in very small lots for immediate delivery. That some consumers now have their stocks well cleaned up is indicated by a slightly better volume of inquiry. Some mills are well caught up on orders, but with the current business coming out are still able to run at about full capacity. Steel bars continue the strong feature of the market, mills holding firmly to 1.40c. Pittsburgh in its territory. Plates are generally quoted at 1.35c. to 1.40c., but a 1.30c. price can be secured on a desirable order. Structural material is in light demand and very little new building work of any size is in prospect. On structural material the 1.35c. price is becoming more general, although some mills are now shading 1.40c. The American Sheet & Tin Plate Company has reduced sheet prices to 2c. for No. 28 black, 3c. for No. 28 galvanized and 1.50c. for No. 10 blue annealed for delivery until January 1, meeting the bottom prices that have recently been made by some of the independent makers. A moderate amount of sheet business is coming out, although the low prices have not greatly stimulated buying. The demand for bar iron continues inactive and local mills are not getting enough orders to keep them running all the time. We quote iron bars at 1.35c. Cleveland mill. Semi-finished steel is weak and it is generally reported that billets are being offered at $22 in the Valley. The demand for light rails continues quite active. Warehouse business is only fair and stock prices are unchanged at 2c. for steel bars and 2.10c. for plates and structural material.

Old Material.—The market shows practically no change. Some small lot sales are being made, but mills are buying only for immediate requirements. Prices are very weak and still show a downward tendency, although quotations on most grades are unchanged. Some dealers are of the opinion that in spite of the present very low prices the bottom has not been reached. Sales of new heavy melting steel scrap have been made to a local mill at $11, this stock commanding about 50c. a ton above the regular market price. Stocks in dealers' yards are reported to be quite large. We quote f.o.b. Cleveland as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.50 to $13.00
Old iron rails	12.50 to 13.00
Steel car axles	16.50 to 17.00
Heavy melting steel	10.25 to 10.50
Old carwheels	12.00 to 12.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.50 to 10.00
Railroad malleable	11.00 to 11.50
Light bundled sheet scrap	7.00 to 7.50
Bundled tin scrap	11.00 to 11.50

Per Net Ton.

Iron car axles	$20.00 to $21.00
Cast borings	5.50 to 5.75
Iron and steel turnings and drillings	4.25 to 4.50
Steel axle turnings	6.00 to 6.50
No. 1 busheling	9.00 to 9.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	11.00 to 11.25
Stove plate	8.00 to 8.50

Cincinnati

CINCINNATI, OHIO, October 29, 1913.—(*By Telegraph.*)

Pig Iron.—The market is unsteady and apparently well-founded reports as to a softening in Northern foundry iron prices are being circulated. A Lake furnace invaded this territory last week, and at least one sale was made to a central Ohio melter for shipment over the next five months at a figure below the parity of the regular market price of $14, Ironton basis. The amount involved was slightly over 1000 tons. While it is rumored that a few Hanging Rock producers are somewhat disposed to meet this competition, there has been no open break thus far. There is no doubt that Southern No. 2 foundry can be obtained for shipment this year at $11, Birmingham, but a considerable number of small orders have been booked above this price, while the majority of producers are firm in maintaining a minimum of $11.50 on either first quarter or first half business. There has been but little buying of foundry iron for future delivery, although the inquiry is improving. A northern Ohio consumer is asking for 3000 tons of Southern No. 2 for first half shipment. A Kentucky melter is expected to close soon for 500 tons for November-March delivery. A central Ohio firm wants a like amount, in addition to 1000 tons of Northern No. 3 foundry for first half shipment. A nearby manufacturer has closed for 500 tons of Northern foundry iron for shipment over the next six months. A local house is negotiating with a Western firm over 3000 tons of malleable, but this is the only large inquiry for malleable before the trade. Shipments on contracts are said to be moving at a reasonably satisfactory rate. While the melt has fallen off considerably, stocks in foundry yards are smaller than they were last year at this time and the furnaces are also said to have less metal on hand, due to curtailment in production. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.75 to $15.25
Southern coke, No. 2 foundry and 2 soft	14.25 to 14.75
Southern coke, No. 3 foundry	13.75 to 14.25
Southern, No. 4 foundry	13.25 to 13.75
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Southern Ohio coke, No. 1	16.20 to 16.70
Southern Ohio coke, No. 2	15.20 to 15.70
Southern Ohio coke, No. 3	14.95 to 15.45
Southern Ohio malleable Bessemer	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—In all three producing districts there is a tendency to shade quotations on prompt shipment 48-hr. brands. The Connellsville price ranges from $2 to $2.25 per net ton at oven for shipment this year, and around $2.25 to $2.50 for future delivery. Wise County and Pocahontas 48-hr. coke is bringing about 15c. a ton more for prompt shipment, with contract prices averaging the same as quoted for Connellsville grades. Foundry coke is dull, and Connellsville prices now range from $2.75 to $3, but a few Wise County and Pocahontas operators are endeavoring to maintain the previously quoted figure of $3 for either prompt or contract business. No contracts of any size, for either furnace or foundry coke, can be reported from this territory.

Finished Material.—The local mill reports specifications on contracts for sheets as being fairly satisfactory, but new business is light. In other lines there is a decided let-up in both specifying and buying. There is practically no contracting for future shipment, and purchases are mainly confined to small lots of steel bars, structural shapes and other finished material, to fill immediate needs. No. 28 black sheets are unchanged at 2.20c. to 2.25c., and galvanized sheets around 3.25c., f.o.b. Newport, Ky., or Cincinnati. Warehouse quotations on steel bars and structural material appear to be firm at 1.95c. and 2.05c. respectively. The railroads are doing but little contracting.

Old Material.—It is stated by one leading scrap dealer that present market conditions are worse than at any time since the summer of 1897. There are practically no stable prices on any kind of old material, and while last week's quotations are continued they can be substantially shaded on attractive business. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

	Per Gross Ton.	
Bundled sheet scrap	$7.00 to	$7.50
Old iron rails	12.00 to	12.50
Relaying rails, 50 lb. and up	19.75 to	20.25
Rerolling steel rails	11.00 to	11.50
Melting steel rails	9.50 to	10.00
Old carwheels	10.75 to	11.25
	Per Net Ton.	
No. 1 railroad wrought	$9.00 to	$9.50
Cast borings	4.50 to	5.00
Steel turnings	4.50 to	5.00
No. 1 cast scrap	9.00 to	9.50
Burnt scrap	6.50 to	7.00
Old iron axles	16.75 to	17.25
Locomotive tires (smooth inside)	10.25 to	10.75
Pipes and flues	6.00 to	6.50
Malleable and steel scrap	7.50 to	8.00
Railroad tank and sheet scrap	4.75 to	5.25

British Rails for Argentina

A Cut of Five Shillings to Shut Out Foreign Mills—No Improvement in Sight

(By Cable)

LONDON, ENGLAND, October 29, 1913.

There is no improvement in the situation. Foreign markets are all weak and no revival in general buying is in sight. As low as £6 2s. 6d. ($29.81) has been accepted for a fair line of rails for Argentina to keep out foreign mills, though 5s. higher is the common price. Pig iron warrant stocks are 164,450 tons, a reduction of about 3000 tons in the week. We quote as follows, without change from last week:

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 12s. 10½d. ($3.13).

(The following prices are per ton of 2240 lb.)

Cleveland pig-iron warrants (Tuesday), 51s. 9½d. ($12.59).

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 52s. 3d. ($12.71).

Ferromanganese, £9 17s. 3d. ($48).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. ($23.11).

Steel bars, export, f.o.b. Clyde, £6 7s. 6d. ($31.09), a decline of 2s. 6d.

Steel joists, 15-in., export f.o.b. Hull or Grimsby, £5 17s. 6d. ($28.59).

Steel ship plates, Scotch, delivered local yards, £7 7s. 6d. ($35.89).

Steel black sheets, No. 28, export f.o.b. Liverpool, £9 ($43.79).

Steel rails, export, f.o.b. works port, £6 7s. 6d. ($31.02).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 85s. ($20.69).

German 2-in. billets, f.o.b. Antwerp, 80s. ($19.46).

German basic steel bars, f.o.b. Antwerp, £4 10s. ($21.89).

German joists, f.o.b. Antwerp, £5 5s. to £5 8s. ($25.55 to $26.28).

(*By Mail*)

Reductions in Wages—Inquiries from United States for Iron and Billets

LONDON, October 17, 1913.

Pig iron prices have broken pretty badly. The truth is that nobody has any confidence in the stability of the markets at large, and everybody is looking for a serious recession of trade. The worst feature of the iron and steel markets is the deplorable conditions of affairs in Germany, where even the largest and best situated plants find it impossible to secure enough orders to keep their machinery going. It is the fight to get business at almost any cost which is reacting prejudicially upon the British market, and even though the competition is not in pig iron but in other descriptions of material the reflex action is nevertheless felt on crude material.

It is possible that the tariff adjustment in the United States may quite upset all preconceived notions as to the effects to be anticipated from the revision, but for the moment people here are not inclined to be oversanguine of America taking iron and steel in quantity from Europe. There is an American inquiry for 3000 tons of low phosphorus pig iron, but one swallow does not make a summer, and anyway 3000 tons is not of much account.

Everyone is asking what has become of the usual autumn demand but nobody can locate either it or

the direction whence it should come. Meanwhile the pig-iron makers are being assisted a little by the reduction in wages which is in progress. Last week there was a reduction of 7½ per cent. declared as regards Cleveland, the average selling price having fallen sufficiently to bring this about, and it is certain that unless the market undergoes an absolute change of front there will be a further cutting down with the next ascertainment of the wages board.

Pig-iron stocks in warrant stores are falling, and a rather curious position may develop. It will be recalled that one result of the prolonged cornering operations in the Cleveland iron market, which had as an aftermath the collapse of the firm of James Watson & Co., of Glasgow, was the creation of a feeling of bitter hostility to the Cleveland warrant market by the largest firm of pig iron and steel producers in the Middlesbrough district. The proposals formulated by this firm in the hope of stifling warrant speculation were carefully considered by the industry but were later ostensibly abandoned. It is not certain, however, that there is not a fresh move on, for the quantity of pig iron held in the warrant stores against which no warrants have issued is increasing week by week, while the total quantity of iron held is diminishing. In time, if the process continues, there will be plenty of iron in the warrant stores but no warrant iron, and people are beginning to ask what this means. Out of about 170,000 tons of Cleveland iron now in store, only 120,000 tons are on warrants, the rest being free. Some day the bold bear may find the warehouses filled with iron but with no warrants to be had, because they have all disappeared. It is on the cards that this is the object of the policy now being pursued. If so, it is as bad a game for the market as was the long drawn out cornering operation, and it may be pretty serious for the owners of the iron.

It would not be an exaggeration to say that the steel market is very flat. The French are pressing half-finished material on our market, and there is a scramble among the Belgians and Germans for all the business about., Prices have been knocked to pieces. There is a fair inquiry for billets and such finished material as bars for America, but nobody seems to have much faith in its resulting in real business. There are offers out now for several thousand tons of billets but it will be surprising if business results.

The general tendency of the markets is downward. The Joist Syndicate has revised its rebates. The basis price remains at £5 8s. ($26.28) f.o.b. Antwerp, but the rebates have been altered in such a way as practically to reduce the selling price by 3s. (73c.) a ton. The rebate from the basis, for Mexico, Cuba and the Antilles is now 10s. ($2.43) a ton; for Siberia and Vladivostock, 8s. ($1.95); for Australia, New Zealand, British East Indies, Dutch Indies, Straits Settlements and British Africa, 6s. ($1.46); for Japan and China, 4s. (97c.); for South and Central America, Spain and Portugal, 3s. (73c.); for the north of England, 6s. ($1.46); for the south of England and Ireland, 3s (73c.), and for Canada and the Pacific coast, 4s. 6d. ($1.10) a ton.

German Makers Feel Slightly Better

Trade Reports Not Wholly Pessimistic —Yet Some Prices Again Lowered

BERLIN, October 17, 1913.

While the general trend of iron trade news has been unfavorable, there have been reports of a better nature; but these have been so lacking in definite form as hardly to merit confidence. On the Bourse here to-day, for example, it was reported that efforts were being made to raise the price of steel bars and it was also stated that the export business in the Rhenish-Westphalian district has become better. The Bourse also took considerable comfort from the news to-day that the selling agency for ship plates has orders ahead for a full year, and in the report that bars have risen slightly in the northern districts of France.

More Reductions in Steel and Iron Bars

Steel bars have dropped to 93 marks ($22.13) net, with Oberhausen as point of shipment. The export price is now 88 to 89 marks ($20.94 to $21.18), f.o.b. Antwerp. The trade organization controlling iron bars has this week voted a reduction of 5 marks ($1.19) per ton. The new prices are 135 to 138 marks ($32.13 to $32.84) for commercial bars; 145 marks ($34.51) for screw stock, 158 marks ($37.60) for rivet stock, and 145 marks (34.51) for horse-shoe bars. The rivet mills yesterday made a reduction of 10 marks ($2.38) a ton on bridge, boiler, and ship rivets, to take effect at once. Other grades were also reduced by raising the rebate 2½ per cent. It is further reported that a second reduction of beams by 5 marks ($1.19) is about to be made, although the Steel Works Union made a similar reduction only about three weeks ago.

The contradictory character of the reports already referred to finds a striking illustration in the following: A correspondent telegraphing from Düsseldorf two days ago gave the result of a circular inquiry among the leading great works of mixed production, showing that the majority had orders till the end of the year in syndicated products (semi-finished steel material, structural shapes, and steel rails), and even till next spring in free products. It is added that the companies are not taking orders beyond that date and are not following the price-cutting of some of the smaller mills. This remarkable dispatch concludes with the remark that a further improvement in export business is looked for. On the other hand, market reviews assert that work is growing scarcer, that prices have recently fallen in the export trade, and that a number of the smaller and medium-sized works have been running on part time and have been dismissing their employees. These contradictory reports may be, in the main, true to the facts. The Düsseldorf dispatch referred only to the great companies that turn out nearly every class of product, while the general reports apply chiefly to smaller concerns and to pure rolling mills. The contradiction in the reports would then mean (and this only confirms other information that has been coming in for some weeks) that the great works of the Union have been getting most of the business coming on the market; also that, by turning more and more in the past few years to the production of finished products, they have now become much more dangerous competitors with the pure rolling mills than ever before.

Heavy September Pig-Iron Shipments

Shipments of the Pig-Iron Syndicate in September, it now turns out, reached 93 per cent. of allotments, as against 88 per cent. for August; also—and contrary to the first reports—stocks of pig iron were actually reduced in September. Stocks at the end of the month amounted to 408,000 tons, or 22,000 tons less than at the end of August. When it is noted that stocks amount to only about the output of the furnaces for a week it is seen that the position of the pig-iron trade is still satisfactory. It is now assumed as certain that the Coal Syndicate will reduce coke and coking coal for the first quarter of 1914 one mark (24c.) per ton. While this will be a certain concession to the furnaces, it is not regarded in the trade as sufficient. The prices of scrap continue to give way and are now reported as being 5 to 6 marks ($1.19 to $1.43) a ton below the level of a month ago.

Dissolution of Tube Selling Agency

The dissolution of the gas and boiler pipe selling agency is an indication of the unsatisfactory conditions prevailing in those products. It was organized in June, after the dissolution of the old trade organization, by Gelsenkirchen, Phönix, Thyssen, the Hahnsche Werke, and one of two other producers not belonging to the Mannesmann group. A sort of arrangement had been entered into by the two groups at that time to maintain prices, but one of the mills attached to the selling agency soon began to cut prices in boiler piping, and the Mannesmanns met the reduction; within a few weeks prices were down 15 marks ($3.57) a ton. The market is now waiting to see whether the former members of the selling agency will inaugurate a campaign of price-cutting against each other. In any case, the outlook in this branch of the trade is exceedingly bad.

German Steamship Lines and the American Tariff

In reference to views expressed in America to the effect that the new tariff law would enable German manufacturers of steel to sell in the United States since the leading German lines had declared themselves willing to assist the movement by making specially low freight rates, the Berlin Boersen-Courier says that it has made inquiries among the great steamship companies and received everywhere the answer that they knew nothing of any such arrangements or promises.

Belgium again sends in reports of falling prices, and it is even asserted that conditions there are approaching a crisis. At the end of last week the export prices of steel and iron bars and heavy plates were reduced 1s. Steel bars to 88 to 89s. ($21.42 to $21.66); iron bars, 93 to 94s. ($22.63 to $22.87), and plates 103 to 105s. ($25.06 to $25.55). This week reductions of 2.50 to 5

francs (48c. to 97c.) in the home prices of steel and iron bars are reported. The new home prices of steel bars are 122.50 to 127.50 francs ($23.64 to $24.61), and iron bars 130 to 135 francs ($25.09 to $26.06).

Contrary to the tendency everywhere else, the Russian trade is reported as having as yet felt no effects of the general reaction. The Prodamenta, or iron syndicate, has even made an advance in commercial bars and plates in the Polish district this week.

St. Louis

ST. LOUIS, Mo., October 27, 1913.

Purchases being confined to immediate needs in practically all cases, despite the fact that actual consumption is keeping up.

Pig Iron.—Sales have been in lots ranging downward from 300 tons, but the demand for these small lots has been well spread over the consuming territory, indicating that the foundries are melting metal as fast as the iron is received. There are no requests for holding back contracted shipments. No business is appearing for 1914 delivery and the furnace representatives are carefully steering clear of solicitation therefor. There is no disposition to shade figures on small deals, but if a sizeable inquiry were to come into sight, it is pretty generally conceded that there would be some very active competition. The only inquiry of moment now pending is one for 2000 tons of malleable. Prices are quoted steady at $11.50 for No. 2 Southern foundry, Birmingham basis; $13.85 for No. 2 Northern foundry, Ironton basis and $14.50 to $15 for No. 2 X Chicago.

Coke.—Demand is altogether for small quantities at the moment, with no future contracts pending of any consequence. Quotations are all based on the prices prevailing at the ovens in the Connellsville and Virginia districts from which most of the supplies for this section come. By-product coke is quoted at about $5.80, St. Louis delivery.

Finished Iron and Steel.—New business continues light, though the movement forward on old contracts is heavy and the demand therefor is insistent. Fabricating shops report themselves fairly busy, with no very large transactions in sight. The Frisco placed a rail order for 3000 tons to apply on an old contract. In light rails the coal interests are buying much more freely. Track fastenings are in a little better demand than at last report. Bars are in fair request, both ordinary and reinforcing, with heavy emphasis on immediate shipment. The only order of importance appearing during the week was for 500 to 600 tons for a commercial building. Despite the slackening of new business there is little or no pessimism apparent and there is not much expectation of any decline of consequence. Salesmen are permitted to compete keenly for business, especially as the relatively small amount appearing does not warrant price concessions and consequent further disturbance of the market without compensating gain.

Old Material.—The scrap market is, if possible, in a more discouraged state than ever, and dealers are too despondent even to cut prices further, on the ground that nothing in the way of price attractions would develop any business. The consumers, they say, simply will not buy at any price and this seems to be true. Reports here indicate that an additional source of worry on the part of dealers is that the Eastern seaboard is likely to be surfeited with scrap imported as ballast in otherwise empty ships and while this material would not reach into the West it would fill up what otherwise might prove an outlet for surplus Western supplies. None of the local industries is buying any old material; there is no demand from other points at a profitable figure at least, and even the railroads are refraining from putting out lists because of the lack of probability of getting any prices worth while. The only list out is one of 1000 tons from the Terminal Association. We quote dealers' prices f.o.b. St. Louis with the reservation noted:

Per Gross Ton.

Old iron rails	$11.00 to $11.50
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 feet	10.00 to 10.25
Relaying rails, standard section, subject to inspection	22.50 to 23.00
Old carwheels	10.00 to 10.50
Heavy melting steel scrap	9.75 to 10.25
Shoveling steel	8.50 to 9.00
Frogs, switches and guards cut apart	9.75 to 10.25

Per Net Ton.

Iron angle bars	$10.00 to $10.50
Steel angle bars	8.50 to 9.00
Iron car axles	17.00 to 17.50
Steel car axles	13.00 to 13.50
Wrought arch bars and transoms	12.00 to 12.50
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.00 to 8.50
Railroad springs	8.50 to 9.00
Steel couplers and knuckles	8.50 to 9.00
Locomotive tires, smooth	9.50 to 10.00
No. 1 dealers' forge	7.50 to 8.00
Mixed borings	3.00 to 3.50
No. 1 busheling	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	5.00 to 5.50
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	7.50 to 8.00
Railroad malleable	7.50 to 8.00
Agricultural malleable	6.50 to 7.00
Pipes and flues	5.50 to 6.00
Railroad sheet and tank scrap	5.50 to 6.00
Railroad grate bars	6.00 to 6.50
Machine shop turnings	4.50 to 5.00
Bundled sheet scrap	4.00 to 4.50

Birmingham

BIRMINGHAM, Ala., October 27, 1913.

Pig Iron.—While there has been no special activity in Southern iron recently, there have been several sales of grades corresponding to Nos. 1 and 2 soft, of which there continues to be a considerable dearth, and the sellers experienced no difficulty in securing the $11.50 basis. The inquiry for 1914 delivery continues spasmodic and no great business has been done, although one company's books show 10,000 tons for first quarter. The price for 1914 iron is $11.50. A conservative but well-posted furnaceman says: "The Birmingham district furnaces continue to secure $11.50 for practically all iron sold. If the manufacturers keep a level head this price can be maintained for 1914 business when that sets in. For the present little is being done for 1914 and even inquiry is not active. I believe some iron might be had at $11.25, but it consists of grades which makers are anxious to get off the yards." It is admitted that there has been some $11.25 iron sold, but indications point to special considerations prevailing in these deals not incident to the trade at large. Consumers are insisting on prompt shipment, and such buying as has been recently done is for immediate use. Stocks on Alabama yards continue to decline. Alabama freight movements in September were in excess of any prior month, which of itself is evidence of heavy metal shipments. There is understood to be a disposition on the part of some foundry interests to take machine cast iron, in which event the largest furnace operators might become more important in the general foundry trade than is the case at present. It is believed that a new furnace may be put in operation if a considerable tonnage of 1914 delivery iron is secured and it is thought not at all improbable that price concessions might be made with that end in view. Total sales during the week have approximated 6000 to 7000 tons. We quote, per gross ton, f.o.b. Birmingham district furnaces (the outside price being secured only in exceptional cases), as follows:

No. 1 foundry and soft	$12.00 to $12.50
No. 2 foundry and soft	11.50 to 11.75
No. 3 foundry	11.00 to 11.25
No. 4 foundry	10.75 to 11.00
Gray forge	10.50 to 10.75
Basic	11.50 to 11.75
Charcoal	24.50 to 25.00

Cast-Iron Pipe.—The only change reported in pipe circles is an advance in the price actually obtained for pipe. Nominal quotations for some time have been cut under, but local makers now assert that this is no longer the case, pipe having reached a level the past month more in accord with the advance in pig iron. Plants as a rule are working on short time with yards well filled with accumulations. Many small orders, sufficient to keep the plants going, have been received. We quote, per net ton, f.o.b. plants as follows: 4-in., $22; 6-in. and upward, $20, with $1 added for gas pipe.

Coal and Coke.—Steam coal is not in as quick demand as operators had hoped, but practically all mines are kept going on orders previously booked. Domestic coal is moving in large quantities owing to the early cold season and prices tend to advance. Coke is still a trifle dull, with a recession of about 25c. in price. We quote, per net ton, f.o.b. oven, as follows: Furnace, $3 to $3.25; foundry, $3.25 to $4.

Old Material.—Dealers have not changed their price cards, in spite of the dullness in the trade. There has been little trading and no special demand for any brand. Stocks remain stationary. We quote, per gross ton,

f.o.b. dealers' yards, the prices being shaded for actual transactions, as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

Boston

BOSTON, MASS., October 28, 1913.

Old Material.—Dealers are expressing little hope of an immediate improvement in the market, and are of the opinion that prices may be further reduced. Business with them is very poor. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	$8.25 to $8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.75 to 14.75
Old iron axles	21.25 to 21.75
Mixed shafting	13.25 to 13.50
No. 1 wrought and soft steel	10.00 to 10.25
Skeleton (bundled)	6.50 to 7.00
Wrought-iron pipe	8.00 to 8.25
Cotton ties (bundled)	7.00 to 7.25
No. 2 light	3.75 to 4.25
Wrought turnings	4.50 to 5.00
Cast borings	5.00 to 5.25
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.25 to 6.50
Cast-iron carwheels	12.00 to 12.25

Buffalo

BUFFALO, N. Y., October 28, 1913.

Pig Iron.—Buying, although very small in volume, is perhaps a little better than last week, aggregating between 5500 and 6000 tons. Inquiry still continues light; such inquiries as are received being small, both in number and amount—and principally for foundry grades, although some malleable has been asked for in territory tributary to this market. The indications are that foundries in general are only fairly busy, but in a few instances makers of small castings and particularly hardware castings are reported as working overtime. Price schedules remain the same as were quoted a week ago and are as follows for fourth quarter delivery f.o.b. furnace:

No. 1 foundry	$14.25 to $15.00
No. 2 X foundry	14.00 to 14.50
No. 2 plain	14.00
No. 3 foundry	13.75 to 14.00
Gray forge	13.75
Malleable	14.25 to 14.75
Basic	14.50 to 14.75
Charcoal, regular brands	15.50 to 16.50
Charcoal, special brands and analyses	17.00 to 19.50

Finished Iron and Steel.—The past week has shown a further gradual adjustment in prices toward a lower level in some finished products, but neither producer nor buyer appears anxious to force the situation and business is limited to actual requirements. Instances are quite numerous that users are only buying from week to week material actually needed. One inquiry for 100 tons of structural material was sent out and the order placed with a mill agreeing to make shipment within six days and similar instances emphasize this condition of the market. Bar material is the one class of product on which the price remains strong, 1.40c. base Pittsburgh representing the general market. Structural material is being sold more freely by some independent interests on the 1.35c. base and plates at 1.30c.; although orders for less than carload lots are bringing from $1 to $2 per ton more. Warehouse prices in this district for structural shapes and plates, including heavy angles, have been reduced $2 per ton. This reduction, however, still leaves a wider margin between jobbers' prices and mill prices than generally obtains under like conditions. There has been some inquiry from can manufacturers for next season's prices for tin plates and it is understood that mills will have prices ready to issue probably within a week. There is no change in the market for wire and wire products, buyers are simply specifying for their actual requirements and no more and are in all cases demanding prompt shipment. Structural steel fabricators are doing a fair amount of business, although new specifications coming out for figuring have fallen off to some extent. The Fort Pitt Bridge Company, Pittsburgh, was low bidder for the Buffalo terminal structure of the Delaware, Lackawanna & Western, calling for 600 tons, but contract has not yet been awarded. The Buffalo Structural Steel Company was low bidder for club house for the Order of the Orioles, Buffalo, 150 tons. Award has been given to the Lackawanna Bridge Company for 1500 tons for viaduct extensions for the Lehigh Valley Railroad to connect with a new passenger station it is to build in Buffalo. Bids are to be taken November 25 by the Board of Supervisors of Erie County for 800 tons for remodeling and enlarging the County Jail, Cyrus K. Porter & Sons, Buffalo, and Alfred Hopkins, New York, architects.

Old Material.—The market remains stagnant and very little business is reported in any commodity. What little movement there is is to out of town districts. Prices remain unchanged from last week. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.25 to $10.75
Boiler plate sheared	12.00 to 12.50
Bundled sheet scrap	7.00 to 7.50
No. 1 busheling scrap	10.00 to 10.50
No. 2 busheling scrap	7.50 to 8.00
Low phosphorus steel scrap	16.50 to 17.00
Iron rails	15.00 to 15.50
No. 1 railroad wrought	12.50 to 13.00
No. 1 railroad and machinery cast scrap	12.00 to 12.50
Steel axles	17.00 to 17.50
Iron axles	22.50 to 23.00
Carwheels	12.00 to 12.50
Railroad malleable	11.50 to ...
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	8.50 to 9.00
Machine shop turnings	5.75 to 6.25
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	5.75 to 6.25
Bundled tin scrap	14.00

New York

NEW YORK, October 29, 1913.

Pig Iron.—Sellers of pig iron have no better assurance of a resumption of buying than they have had for several weeks. Without exception they refer to the efforts of consumers to get their iron forward at the same time that most of the latter are unwilling to contract now for iron to be delivered next year. One inquiry for 2000 tons has come from an interest whose buying is done here for several plants. In New Jersey there is an inquiry for about 1500 tons from a large consumer, deliveries chiefly after January 1, and another New Jersey foundry is asking for 500 tons, all for delivery in the first quarter. An inquiry for special iron for export covers about 1000 tons. The market is rather weaker, but the average furnace company has made no change in quotations. Some further reduction in furnace stocks in the East is reported. No early change in the present attitude of buyers is looked for. Some point is made of the fact that any readjustment in foundry pig iron prices that may be ahead of the trade will start from a level much nearer cost than the decline that extended over the first six or seven months of the year. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $16 to $16.25; No. 2 X, $15.75 to $16; No. 2 plain, $15.50 to $15.75. Southern iron is quoted at $15.75 to $16.25 for No. 1 foundry and $15.25 to $15.75 for No. 2.

Finished Iron and Steel.—The waiting attitude of the buyer is conspicuous. Specifications on contracts have fallen off and the only orders placed with the mills seem to be for necessities of the moment. The market quotations are largely nominal, with steel bars still quite firm only by contrast with the rest of the finished products, for it seems to be the belief that even the strong hands controlling the distribution of steel bars would not hold out long against large attractive offerings, particularly in view of the business now being diverted to iron rolling mills. In the face of bar iron selling as much as $5 under bar steel, no information is at hand of quotations less than the Pittsburgh base of 1.40c. Plates and shapes are more generally obtainable at 1.30c., Pittsburgh, than last week, but most of the business, small though the total is, is placed at 1.35c. Pittsburgh. Exceeding dullness pervades the structural field, but there is more promise in car buying, though this is accompanied by lower

prices. For example, it has been figured that a recent car purchase was made at a price which, allowing usual wage and other charges, would require figuring the steel at 1.10c. Pittsburgh. In structural lines in this section of the country, little new work has developed, but the fact remains that the work which has been pending for some time and seems likely to develop into business, aggregates 25,000 tons, exclusive of New York subway work and a large tonnage which will be needed for the 1000-ft. piers which have been proposed for New York harbor. The awards which have been made since last week's report are chiefly for relatively small railroad bridges. Crocket & Tharle are general contractors for a government examining warehouse at Ottawa, requiring 2500 tons and Marc Eidlitz & Son are said to have the contract for the Yale Club, New York, requiring 2000 tons. Plans are out for a schoolhouse at Kingston, N. Y., which will involve 400 to 500 tons. In railroad cars it is probable that the total going business is over 6000 cars, of which over 500 are passenger equipment cars. In addition to lists given in recent weeks, may be mentioned 500 hopper car bodies for the Wabash; 2000 coal cars for the Wabash Pittsburgh Terminal Railway; 1000 box and 1000 gondolas for the Buffalo, Rochester & Pittsburgh, which recently bought 1000 hopper cars from the Cambria Steel Company; 500 hopper and 250 gondolas for the Lehigh & New England, and 400 hopper cars for the J. B. Jenkins Coal & Coke Company. Sales of cars include 522 for the Mobile & Ohio to the Pressed Steel Car Company; 600 gondolas and 500 ore cars for the Soo Line to the American Car & Foundry Company, which also took 13 coaches and 3 combination cars for the Pennsylvania and 10 postal cars for the Chicago, Milwaukee & St. Paul, and 200 underframes for the New York Central to the Merchants' Despatch Transportation Company. We quote mill shipments of plain material and plates at 1.35c. to 1.40c., Pittsburgh, or 1.51c. to 1.56c., New York, though on desirable business the price is 1.46c., New York. Steel bars are: 1.40c., Pittsburgh, or 1.56c., New York, and bar iron 1.30c. to 1.45c., New York. Store prices range from 1.95c. to 2.05c. for steel bars and 2c. to 2.10c. for iron bars and steel plates and shapes.

Ferroalloys.—Inactivity dominates the market. Inquiries for 80 per cent. ferromanganese are scarce and the few sales that are made are small lots only. The English producers' quotation is $50, Baltimore, while German ferromanganese can be obtained for $49 to $49.50. Quotations for 50 per cent. ferrosilicon are still $75, Pittsburgh, for carloads; $74 for 100 tons, and $73 for 600 tons or over.

Old Material.—The condition of the market is bad. Consumers are reducing their bids, and dealers are therefore looking for still lower prices, although some are beginning to believe that the bottom has either been reached or is not far off. Prices of old material are now getting so low that holders will hesitate to part with their accumulations of old material, waiting for better conditions. Steel companies in New Jersey and eastern Pennsylvania are so well supplied or are so curtailing their operations that most of them declare themselves out of the market. Rolling mills are buying almost nothing. Cancellations are frequent, almost every buyer ordering shipments discontinued immediately with the expiration of the time noted in a contract. Some little movement is taking place in cast scrap. Dealers' quotations are as follows, per gross ton, New York:

Old girder and T rails for melting	$8.00 to $8.50
Heavy melting steel scrap	8.00 to 8.50
Relaying rails	20.50 to 21.00
Rerolling rails	11.00 to 11.50
Iron car axles	20.50 to 21.50
Steel car axles	14.00 to 15.00
No. 1 railroad wrought	11.00 to 11.50
Wrought iron track scrap	10.00 to 10.50
No. 1 yard wrought, long	9.50 to 10.00
No. 1 yard wrought, short	8.50 to 9.00
Light iron	3.50 to 4.00
Cast borings	4.50 to 5.00
Wrought turnings	4.50 to 5.00
Wrought pipe	8.00 to 8.50
Car wheels	11.00 to 11.50
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	8.25 to 8.75
Locomotive grate bars	7.50 to 8.00
Malleable cast	8.00 to 8.50

Cast-Iron Pipe.—For some reason the contract has not yet been placed by Atlantic City, N. J., on which it received bids October 16. As this is an important transaction, covering 6483 tons, the trade is awaiting developments with interest. Municipal lettings in sight are few and unimportant. Pipe manufacturers report the usual fall business with private buyers who are hurrying work that remains to be done before winter prevents pipe-laying operations. Some consumers are again sounding the market for spring delivery. Carload lots of 6 in. continue to be quoted at $23 to $23.50 per net ton, tidewater, New York.

Metal Market

NEW YORK, October 29, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Oct.	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
23	17.00	16.75	40.50	4.35	4.20	5.40	5.25
24	17.00	16.75	40 45	4.35	4.20	5.40	5.25
25	16.87½	16.62½	40.30	4.35	4.20	5.45	5.30
27	16.87½	16.62½	40 20	4.35	4.20	5.45	5.30
28	16.87½	16.62½	39.90	4.35	4.20	5.45	5.30
29	16.87½	16.62½	40.10	4.35	4.20	5.45	5.30

Small lots of copper are offered at lower prices, but consumers show no disposition to buy and the entire market is dull. Tin is lower and quiet again after a little activity. In lead there has been a good business at steady prices. Spelter is stronger as a result of more numerous inquiries. Antimony has a better tone and prices have taken a turn upward.

New York

Copper.—In the latter part of last week it was rumored that there had been some heavy buying, but this has not been confirmed and is doubted by some persons in the copper trade. The general appearance of the market throughout the entire week has been one of inactivity. It is flat at the present time and there can be no question that the large agencies are not pressing sales while consumers do not seem anxious to buy. The big sellers are holding to 16.75c. cash for electrolytic. For some days there have been offered a few small lots of electrolytic at 16.62½c. cash, but despite the price concessions and the smallness of the lots they have not been taken up. Should any large demand develop the prices of these lots would advance immediately. Lake is held nominally at 16.87½c. to 17c. The London quotations to-day were £74 12s. 6d. for spot and £73 5s. for futures. The exports this month total 26,388 tons.

Pig Tin.—The slightly better demand of last week has quieted down and business again is so small that leaders in the tin market admit that they are now doing next to nothing. In view of the fact that many old contracts have been liquidated in the recent past it is considered somewhat puzzling that consumers can hold out so long without substantial buying. The only explanation is that they had on hand more metal than previous estimates showed and that consumption has declined in a way that makes their stocks cover more time than was expected. Some estimates are now placing deliveries for this month as low as 2900 tons, following the also light deliveries of 3100 tons in September. Others who are trying to fathom the state of the market believe that deliveries may be all of 3500 tons, inasmuch as in the month about 6050 tons will be available. In any event, as stated last week, stock on November 1 will be large. Yesterday tin dropped below 40c., sales having been made at 39.90c. The quotation to-day is 40.10c. London is quoted to-day at £183 5s. for spot and £184, 5s. for futures. Arrivals total 3515 tons, and there is afloat 1705 tons.

Lead.—The one bright spot in metals has been in lead. Though prices have been stationary at 4.35c., New York, and 4.20c., St. Louis, a large business was done last week and this week started well. On Monday an attempt was made to advance the price of St. Louis to 4.22½c., but numerous other offerings minus the advance of 2½ points steadied the market at 4.20c. It is evident that consumers who are replenishing their stock on a basis of 4.20c., St. Louis, had no confidence in the recent higher prices. It is believed that quotations have touched bottom and also that fluctuations will be within a narrow range in the next few months inasmuch as the several bull and bear factions neutralize each other.

Spelter.—The market has advanced about 10 points in the past week, following a better business and a considerable amount of inquiry, much of which, however, has not culminated in buying as yet. Quotations are 5.45c. to 5.50c., New York, and 5.30c. to 5.35c., St. Louis.

Antimony.—After a long period of depression a little greater strength has developed in this metal because of an increase in both buying and inquiry. The

former, however, has not been heavy. Hallett's is quoted at 7.25c. to 7.37½c.; Cookson's at 7.62½c. to 7.75c., and Chinese and Hungarian grades at 6.50c. to 6.75c.

Old Metals.—The market continues inactive. Dealers' selling prices remain unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	15.50 to 15.75
Copper, heavy and wire	15.00 to 15.25
Copper, light and bottoms	13.25 to 13.50
Brass, heavy	9.75 to 10.00
Brass, light	8.25 to 8.50
Heavy machine composition	13.50 to 13.75
Clean brass turnings	9.00 to 9.25
Composition turnings	11.75 to 12.25
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	4.37½

Chicago

OCTOBER 27.—Sales of Lake copper have been made much more freely, and a very good inquiry is still noted. We quote as follows: Casting copper, 16.75c.; Lake copper, 17c. to 17.25c., for prompt shipment; small lots ¼c. to ⅛c. higher; pig tin, carloads, 41c.; small lots, 43c.; lead, desilverized, 4.30c. to 4.35c. and corroding, 4.55c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.25c. to 5.30c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, $7.50 f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600 lb. sacks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 14c.; copper bottoms, 12.50c.; copper clips, 13.25c.; red brass, 12.50c.; yellow brass, 9c.; lead pipe, 3.75c.; zinc, 3.75c.; pewter, No. 1, 26c.; tin foil, 32.50c.; block tin pipe, 33c.

St. Louis

OCTOBER 27.—The metal markets have eased off during the week, particularly so far as Missouri products are concerned, and lead now stands at 4.22½c. bid, 4.25c. asked and spelter at 5.25c. bid and 5.30c. asked. Copper has been quiet, with Lake at 17.35c. to 17.60c. and electrolytic at 17.22½c. to 17.45c. Tin is quiet at 40.70c. to 40.90c. Cookson's antimony is dull at 7.95c. In the Joplin ore market zinc sulphides brought $38 to $42 per ton, assay basis of 60 per cent., with the choicer grades settled for at $45. Calamine brought $21 to $22, assay basis of 40 per cent., while the top settlement was $26. Lead ore continued weak at $52. We quote miscellaneous scrap metals as follows: Light brass, 5.50c.; heavy brass and light copper, 10c.; heavy copper and copper wire, 11.50c.; pewter, 24c.; tinfoil, 28c.; zinc, 2.75c.; tea lead, 2.75c.; lead, 3c.

Iron and Industrial Stocks

NEW YORK, October 29, 1913.

The stock market has shown greater strength. One of the developments contributing to this strength was the announced change in management of the Rock Island Railroad, whose condition has for some time caused fears of a receivership. Another stimulating influence was the anticipation of an excellent financial showing by the United States Steel Corporation for the third quarter. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can, com.	30¼- 32¾	Railway Spring, com.	25
Am. Can, pref.	90⅛- 92¼	Republic, com.	19¼- 20¾
Am. Car & Fdy., com.	43¾- 45¼	Republic, pref.	79⅞- 82
Am. Car & Fdy., pref.	113½	Rumely Co., com.	20 - 20½
Am. Loco., com.	31 - 31¾	Sloss, com.	28 - 29
Am. Loco., pref.	98 - 98¼	Pipe, com.	9⅝- 10
Am. Steel Fdries.	27	Pipe, pref.	48
Beth. Steel, com.	30 - 31	U. S. Steel, com.	56⅛- 59⅜
Beth. Steel, pref.	70 - 71½	U. S. Steel, pref.	106 -107¼
Colorado Fuel	27¼- 29⅝	Va. I. C. & Coke	42
General Electric	140¼-141½	Westinghouse Elec.	65½- 68½
Gr. N. Ore Cert.	32 - 34¼	Am. Ship, pref.	91⅛
Int. Harv., com.	103½	Chic. Pneu. Tool	51¾- 52
Int. Harv., Corp.	103½	Cambria Steel	48 - 49½
Int. Pump, com.	6⅛	Lake Sup. Corp.	22½- 23
Int. Pump, pref.	23⅜	Pa. Steel, pref.	63½
Lackawanna Steel	37	Warwick	10½
Nat. Enam. & St., pref.	77⅞	Crucible Steel, com.	15¼- 16
Pressed Steel, com.	25 - 25¾	Crucible Steel, pref.	89¼- 90
Pressed Steel, pref.	97 - 98		

Dividends Declared

The Vulcan Detinning Company, 21 per cent. on account of accumulated back dividends on the preferred stock, payable November 20. Henry Wollman, counsel of the Vulcan Company, states that the settlement with the American Can Company has been accomplished, and that $617,000 which the latter was to pay in settlement of patent litigation was paid October 21, as agreed upon.

The Pressed Steel Car Company, regular quarterly, 1¾ per cent on the preferred stock, payable November 19.

The Lackawanna Steel Company, regular quarterly, 1¾ per cent on the preferred stock, payable December 1.

The Pennsylvania Steel Company, 2½ per cent. on the preferred stock, payable November 1.

The Warwick Iron & Steel Company, semi-annual, 4 per cent., payable November 15.

The Standard Sanitary Mfg. Company, regular quarterly 1¾ per cent. on the preferred and 1½ per cent. on the common stock.

Protest from Steel Corporation Employees

Following the petitions already mentioned, which have gone to Washington from employees at various plants of subsidiaries of the United States Steel Corporation, there was sent to Representative Underwood last week a petition signed by 13,000 employees of the Tennessee Coal, Iron & Railroad Company. Like the others, it protested against the effort of the Government to dissolve the Steel Corporation, and asked for legislation ordering the withdrawal of the pending suit to that end. Representative Underwood presented this petition in the House. Birmingham, Ala., newspapers quote a number of well-known citizens in protest against the dissolution suit, and it is announced that 200 petitions are now in circulation in Alabama asking for its discontinuance.

New Pennsylvania Rolling Mill

Howe & Samuel are building a new rolling mill at Danville, Pa., to make special bars for crucible-steel melting purposes. Frank Samuel, Harrison Building, Philadelphia, Pa., is one of the owners.

The Cutler-Hammer Mfg. Company, Milwaukee, Wis., maker of electric controllers, has opened a district office in Cincinnati, located in the Fourth National Bank Building. The general increase in business has made it necessary to establish a permanent office in Cincinnati. Horace L. Dawson, formerly of the engineering department of the company, and recently one of the sales engineers connected with its Chicago office, will be in charge of the new office.

The Burbach-Eich-Düdelingen Works, Düdelingen, Germany, it is announced, will put in another electro-steel furnace and an open-hearth plant will be built to run in connection with it. This is a new combination, which, it is said, will not have a counterpart anywhere in the world. This company put in an electro-steel furnace at Eich several years ago, but its operations were unsuccessful for a considerable time. It was finally reconstructed, and results have now for some time been satisfactory.

Members of the Cleveland Engineering Society will be guests of the Engineers' Society of Western Pennsylvania at Pittsburgh on Saturday, November 1. Trips of inspection will be made to the plants of the Pressed Steel Car Company at McKees Rocks, Pa., and the Universal Portland Cement Company at Universal, Pa.

Corrigan, McKinney & Co., Cleveland, Ohio, have placed an order with the Morgan Construction Company, Worcester, Mass., for a 21-in. and an 18-in. continuous sheet bar and billet mill with complete equipment, including shears, tables, hot beds, etc., for their new steel plant.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has received an order from the Erie Construction Company, Altmar, N. Y., for two waterwheels. They are to be installed in connection with a hydroelectric plant.

An electrically operated car dumper will be installed by the Cleveland & Pittsburgh Dock Company at Conneaut, Ohio. It is expected that the order will be placed with a Cleveland firm shortly.

Personal

E. P. Crawford, president McKeesport Tin Plate Company, McKeesport, Pa., has been elected a director of the Bank of Pittsburgh, the oldest national bank in that city.

Henry F. Pope, vice-president National Malleable Castings Company, Cleveland, Ohio, has been elected president of that company to fill the vacancy caused by the recent death of Albert A. Pope. E. L. Whittemore, formerly a vice-president, has been made chairman of the board of directors; Clayton Mark and S. L. Smith have been re-elected vice-presidents, and O. K. Brooks has been re-elected secretary and treasurer. N. S. Lewis has been made assistant secretary and assistant treasurer. All the officers reside in Cleveland except Mr. Mark, who lives in Chicago.

E. B. Wilkinson, formerly blast furnace superintendent of the Carbon Iron & Steel Company, Parryville, Pa., later with Ladd & Baker of Philadelphia, is now superintendent of the Midland blast furnace of the Pittsburgh Crucible Steel Company, Midland, Pa.

E. P. Ross has been appointed furnace superintendent of the Colonial Iron Company, Riddlesburg, Pa.

Edgar A. Custer, for a number of years president of the Tacony Iron Company, has severed his connection with that company, withdrawing from permanent mold work, and has engaged in business as a consulting engineer in foundry practice with headquarters at Forty-first street and Baltimore avenue, Philadelphia, Pa.

H. J. Chambers, of the steel construction firm of Hamilton & Chambers, 29 Broadway, New York, who has been abroad for some time, returned on the Lusitania this week.

J. Walther, works manager of the Gutehoffnungshütte, Gelsenkirchen, Germany, has been in the United States for several weeks visiting wire and other iron and steel plants. He was a guest at the meeting of the American Iron and Steel Institute at Chicago last week.

Ralph Davis, who for some years has been connected with the Philadelphia office of the Lukens Iron & Steel Company, Coatesville, Pa., has succeeded the late Robert Gardner as salesman in Philadelphia and the State of Pennsylvania. Harry Loeb, who has been salesman in the New York district, has also taken on the Southern territory formerly covered by Mr. Gardner.

Myron G. Doll, for several years local manager at Salt Lake City for the Sullivan Machinery Company, Chicago, has resigned. His successor is H. E. Moon, who has been associated heretofore with the Denver office of the same company.

The resignation of John Calder as president of the International Motor Company is announced, action having been taken at a meeting of directors October 22. Vernon Munroe, previously secretary of the company, was elected to succeed Mr. Calder and B. A. Guy, formerly treasurer, became secretary and treasurer. The company did not make public the reason for the changes.

Frank E. Getts took charge October 20 as district sales manager of the Chicago office of the Alberger Pump & Condenser Company, of New York. At the time of his appointment to this position, he was engineer in the Chicago office of the General Electric Company, and is well known throughout the United States in connection with important steam turbine installation.

G. L. Spence, formerly sales manager of the Pratt & Cady Company, Hartford, Conn., has joined the staff of Fairbanks, Morse & Co., and will be attached to the company's Springfield, Mass., office.

Dr. M. G. Christie, associate professor Imperial College of Science, London, England, is making an investigation of the by-product coke industry in the United States, representing the Otto interests.

The bankruptcy case of the Southern Iron & Steel Company, now the Standard Steel Company, was wound up October 23 in the United States District Court at Birmingham, Ala., by Judge E. H. Dryer, referee in bankruptcy, and the final dividends declared. The unsecured creditors received 9½ cents and the bondholders 16½ cents on the dollar.

Obituary

ASHMEAD G. RODGERS, for the past 12 years general superintendent of the Carborundum Company's plant at Niagara Falls, N. Y., died at his home in that city October 22 as the result of injuries received when he was thrown from an automobile October 5. He was born in Albany, N. Y., in 1872. For many years he was superintendent of the Eddy Electric Company, Hartford, Conn. He was a member of the American Electrochemical Society, Chemists' Club, American Institute of Electrical Engineers and various local associations, including the Board of Trade at Niagara Falls. He had presented papers before various societies on grinding and shop practice and held several patents on mechanical and electrical devices. He leaves a widow, a daughter and a son.

RICHARD B. HEMMING, president Hemming Brothers Company, New Haven, Conn., died October 17.

The last fortnightly bulletin of the American Railway Association shows a shortage of freight cars for the first time in nearly a year. Against a net surplus of 10,374 idle cars October 1, there was a shortage of 6,048 on October 15. Last year a shortage appeared first on September 12, the hight of the season being reached November 7. Idle cars did not begin to accumulate again until the period covered by the statement of December 31. The railroads do not look for a condition as serious this year, owing to the smaller grain crop and the acquisition of a large amount of new equipment in the last few months.

A campaign of "safety first" has been inaugurated by the Lukens Iron & Steel Company, Coatesville, Pa., in an effort to cut down to a minimum the number of accidents that happen to employees about the plant. A committee consisting of heads of departments has been studying the efforts put forth in other plants to lessen the danger to life and limb and the best of these will be put into force at the Coatesville plant. Already a number of safety appliances have been installed and suggestions for lessening danger are being solicited from the employees themselves.

The Pope Mfg. Company, Hartford, Conn., has been placed in the hands of a receiver on petition of the New Departure Mfg. Company, Bristol, Conn., a merchandise creditor, and Frederick F. Small, a stockholder. The common belief is that a reorganization will be effected, and the business continued. A lack of sufficient working capital is given as the chief cause of the failure, coupled with the money stringency, and the existing dull automobile market.

In the notice regarding the loose leaf circular of the Gisholt Machine Company, Madison, Wis., dealing with the use of its turret lathe, which appeared on page 952 of *The Iron Age*, October 23, two errors occurred. The face width of the gas engine flywheels which were shown being finished is 1 11-16 in., instead of 1 1-16 in., and the average time for the completion of this operation is between 5 and 6 min. and not 50 sec., as was erroneously stated.

The Coatesville Rolling Mill Company, subsidiary of the Worth Brothers Company, Coatesville, Pa., has started the erection of a handsome four-story office building for the accommodation of the Valley rolling mills, the Viaduct rolling mills and the Viaduct tube works. The building will be completed early next spring and will be up to date in every particular. The present offices connected with these plants are scattered and much crowded.

The new centrifugal pump with helical impeller illustrated in *The Iron Age* of October 23 is the subject of a paper to be presented before a meeting of the American Society of Mechanical Engineers in New York, at 29 West Thirty-ninth street, on the evening of November 11, by C. V. Kerr, sales engineer, A. S. Cameron Steam Pump Works, New York.

The American Steel Foundries has successfully introduced the use of powdered coal in the open-hearth department of its Sharon, Pa., plant.

Pittsburgh and Valleys Business Notes

W. L. Rodgers, president Pittsburgh Gage & Supply Company, Pittsburgh, recently transferred to that company adjoining property having a frontage of 72 ft. on Liberty avenue, running back 174 ft. to a private siding, which will likely be used at some time in making extensions.

The blast furnace of the Clinton Iron & Steel Company, Pittsburgh, is nearly completed and is expected to be blown in early in November. It will be recalled that the old stack of this company collapsed some months ago, and the new stack takes its place. It will have a daily capacity of 350 to 400 tons, and is the only merchant furnace in the Pittsburgh district, i.e., selling its pig iron in the open market.

Directors of the Westinghouse Machine Company, Pittsburgh, have re-elected former officers as follows: George Westinghouse, president; H. W. Westinghouse, vice-president; H. D. Herr, vice-president and general manager; D. L. Brown, treasurer; D. S. Grubb, secretary and auditor; C. V. Holmes, assistant treasurer; C. W. McGhee, assistant secretary; G. F. White, assistant auditor, and B. F. Landers, acting assistant auditor. An executive committee was also elected, consisting of J. D. Callery, chairman; H. M. Brackenridge, John F. Miller, J. R. McCune and W. D. Uptegraff.

The A. M. Byers Company, Pittsburgh, operating a puddling mill at Girard, Ohio, which has been closed down since July 1, on account of the refusal of the company to sign the Sons of Vulcan puddling scale, calling for a flat rate of $7 a ton for boiling, has declared its mill open and will refuse hereafter to treat with this organization. It is likely that the Youngstown Sheet & Tube Company, whose puddling plant has been closed since the above date, will also declare its mill open, as President J. A. Campbell stated recently that under no consideration would his company sign the Sons of Vulcan scale.

The Crucible Steel Company of America states that the paragraph printed in *The Iron Age* of October 23 to the effect that its subsidiary, the Pittsburgh Crucible Steel Company, is offering to the public an issue of bonds to finance improvements and additions at Midland, Pa., is unauthorized and untrue. The Pittsburgh Crucible Steel Company is not floating new bonds of any kind, nor does it contemplate the erection of a blast furnace or any further improvements than those in the original plans for the development of the Midland plant.

The Westinghouse Air Spring Company, one of the Westinghouse interests, is engaged in the manufacture of air springs for automobiles and other motor vehicles. It has an authorized capital stock of $2,500,000, of which $2,300,000 have been issued. The product is manufactured at the works of the Westinghouse Machine Company in East Pittsburgh and also at Derby, Conn.

At a recent meeting of the executive committee of the Westinghouse Machine Company an appropriation of $125,000 was made to provide additional manufacturing facilities, especially for the following new lines: The impulse turbine, which is being used in large numbers by central stations and industrial plants, and the reduction gear, which, in addition to the demand for marine installation, is finding a wide field of application in connection with the large direct-current generators. Orders for automobile rotary valve motors have also contributed to increasing need for additional equipment. The department manufacturing air springs for automobile trucks has also felt the influence of increased business. The company contemplates devoting a portion of the appropriation to securing additonal machine tools designed to use high-speed tool steel.

John L. Mullen, structural steel contractor, Wabash Building, Pittsburgh, has closed contracts for steel erection work as follows: Fletcher Trust Company Building, Indianapolis, Ind., 100 x 120 ft., 14 stories, 2500 tons; James Hay Building, Pittsburgh, two additional stories, 200 tons; Pittsburgh Railways Company, boiler support at Brunots Island power house, 500 tons; central building for Carnegie Institute of Technology, and a building for the Margaret Morrison school.

The Standard Seamless Tube Company of Pittsburgh, in which the Fownes interests predominate, has broken ground at Economy, Pa., for the erection of a seamless tube mill. It is not expected that the plant will be completed before the summer of 1914.

The Barrett Machine Tool Company, Meadville, Pa., has been incorporated with a capital stock of $100,000 by James O., Charles J., Frank N., and George W. Barrett, for the purpose of manufacturing machinery, machine tools and vises.

The Cherry Tree Iron Works, Cherry Tree, Pa., founder and machine worker and manufacturer of mine cars, has let the contract for a new brick foundry, with cupola, blower, elevator, craneway, etc., and expects to have it in operation within a month. The floor space has been increased about 50 per cent. over the old foundry, which was destroyed by fire. The company is now using a temporary structure as a foundry. W. C. Schade is president and general manager and R. F. Pitcairn is treasurer.

The Union Drawn Steel Company, Beaver Falls, Pa., is putting up a brick and steel addition to replace its present pickling department, and also to make room for annealing furnaces to take care of its special products for drawing and for the heat treatment of steel for automobile work.

The Concrete Steel Company, whose plant is now located on Wilson avenue, Youngstown, Ohio, has bought a new site near the Ohio works of the Carnegie Steel Company, and will put up a steel building, 65 x 250 ft., to be erected by the Fort Pitt Bridge Works, Pittsburgh. The company expects to occupy the new plant about January 1.

The William Tod Company, Youngstown, Ohio, has received an order from the Minnesota Steel Company, Duluth, Minn., for the tables for its 20-in. rail mill, to be delivered within six months. The company recently shipped a 40-in. blooming mill and blooming mill engine, with shears and tables, for the new open-hearth steel plant of the Brier Hill Steel Company, Youngstown, and is now shipping the 24-in. continuous mill and 24-in. merchant mill, with accessories.

The United States Tile Company, Parkersburg, W. Va., and the Canton Roofing Tile Company, East Sparta, Ohio, have merged and formed a corporation known as the United Roofing Tile Company, with a capitalization of $400,000. The company will build three additional kilns at the Parkersburg plant.

The A. L. Thompson Mfg. Company, Huntington, W. Va., has been incorporated with $25,000 capital stock for the purpose of manufacturing gas and electrical supplies. The incorporators are A. F. and H. H. Thompson, C. W. Campbell and others.

Creditors of the Leetonia Steel Company, Leetonia, Ohio, filed an involuntary petition in bankruptcy in the United States District Court at Cleveland October 27. Liabilities are said to be in excess of $1,000,000, a mortgage to the Commonwealth Trust Company of Pittsburgh aggregating that amount. The petition states that the company has committed an act of bankruptcy by filing an answer admitting insolvency in a receivership suit recently brought in the Columbiana County Court. The company was organized early in the year to build a steel plant in connection with the blast furnace property of the Salem Iron Company at Leetonia. The petition says that the large indebtedness was incurred in the purchase of the property of the Salem Company.

W. W. Lindsay & Co., constructing engineers, Harrison Building, Philadelphia, Pa., have secured the contract from the Broken Hill Proprietary Company, Ltd., New Castle, Australia, for the equipment of an open-hearth furnace plant. The contract covers the steel work required for three 60-ton open-hearth furnaces, two soaking pits, ingot molds, charging boxes, cars, flues, etc. All the material will be forwarded in one shipment early in 1914 and will weigh approximately 3000 tons. Plans and specifications were prepared by James B. Ladd, consulting engineer, Philadelphia.

Channel Passes and the Pitch Line

Their Proper Location to Prevent Backlash—Three German Proposals Compared

In Stahl und Eisen, for September 18, 1913, there is an instructive article on the subject of the proper relation between the placing of channel passes in regard to the pitch line, by E. Werlisch, the rolling mill superintendent at the Peinehütte. In rolling channels grooves are cut in the lower roll, or the middle roll in the case of a three-high mill, such that the metal forming the flanges receives an even pressure and is completely surrounded. In older practice there were several such passes, and even today there are at least two so that the flanges may be finished smooth and of even hight. The incorrect placing of these passes in regard to the pitch line often brings about unpleasant consequences during rolling, for after the bar leaves the rolls there may be a strong backlash.

The reason for this may be briefly outlined. If the rolls are carefully watched, it will be noticed that after the bar leaves them the upper one is still for the fraction of a second. It is then engaged by the wobbler and spindle and is carried round with them. With the older method of placing the channel passes the diameter of the lower roll and therefore the circumference velocity is much greater than that of the upper roll. This greater velocity causes the upper roll to increase in speed when a bar is in the pass, so far as there is play in the wobblers, but when the bar has passed it drops back with a perceptible backlash. If several bars are being rolled at the same time, broken spindles and wobblers are to be expected. In any case, great care must be taken during rolling so as to avoid operating troubles, and this is directly responsible for a decrease in output which is more or less dependent on the number of such passes.

Several proposals have been made in Germany regarding the proper position of these passes, notably those of Schaefer, Tafel, and Dr. Puppe. They all tend to place the section deeper and nearer to the pitch-line, thereby avoiding the evil of the backlash, which is caused by the difference in the roll diameters. Speaking roughly, Schaefer so arranges the pass that the roll diameters are equal, and the pitch line bisects the back of the channel. Tafel takes a middle course. He divides the distance between the center line of the back and of the whole section according to the ratio 2a :b, and arranges the pass so that the pitch line shall go through this point. In this ratio a is the average thickness of the flange, and b the distance between the middle of the two flanges. Dr. Puppe proposes to have the pitch line pass through the center of gravity of the section.

If these proposals are considered, that of Schaefer is seen to be the least practicable, because it does not take into consideration the length and dimensions of the flanges. Naturally, the contact surfaces between bar and roll are greater when the flanges are long and thick than when they are short and thin, and it must also be remembered that the section is almost all in the lower roll, the upper one merely acting as a cover. The other two proposals give this more consideration.

Experiments were made at Peine, beginning in 1890, placing the pass so that the pitch line went through the center of gravity, but without gaining the desired results. The section was channel N.P.10. New experiments were recently made on a 565 mm (22.2 in.) mill with the finishing pass of channel N.P.12 according to the three proposals, as shown in Fig. 1, and the action during rolling was carefully observed.

Tafel's proposal gave the best results. The backlash was altogether done away with, as also when Schaefer's method was used, but with Dr. Puppe's there was a duller blow than before, though still readily audible. In regard to the effect on the guides, Puppe's proposal gave the best results; then came that of Tafel, and finally Schaefer's. For further work the conclusion drawn was that Tafel's method is the one to follow.

There was a brief discussion, during which Tafel gave his method in detail. The channel section can be divided into two parts. The back is shown with inclined shading in Fig. 2, and the flanges. For the first, the pitch line should pass through the middle, xx; for the second through the middle of the flanges, yy. All three rectangular pieces must, however, be considered together. Many designers consider only the flanges and lay the pitch line along yy. Schaefer considers only the back and lays it along xx. By his method both are borne in mind. The pitch line is placed between xx and yy according to the ratio $\frac{F}{f+f}$. If $f+f=F$, then the new line zz comes midway between x and y. If F is ten times greater than f+f, it is so placed that it is 10 times further from yy than from xx. It will be noticed that this differs slightly from the method given in the paper. Holzweiler of Aachen said that his practice had exactly confirmed the remarks of Tafel, but that it was necessary to carefully consider the reduction given the back and flanges. If the back alone is reduced, then the pitch line must be placed nearer to it, and the opposite if the flanges only are reduced. Tafel further said it was assumed that the section was closed and had no side pressure. If the latter were present, then f_1 should be taken instead of f, and the line yy is then correspondingly higher.

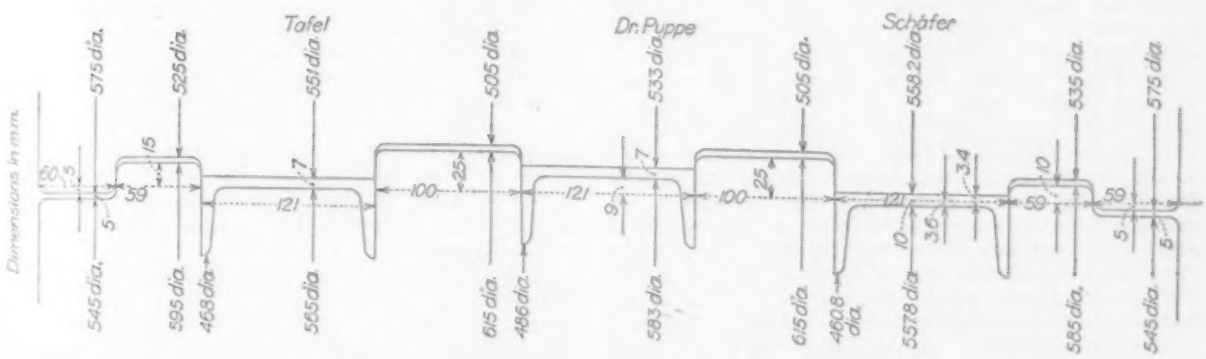

Fig. 1—Finishing Roll for Channel N. P. 12 with Various Locations of Passes

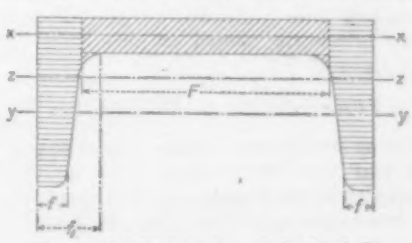

Fig. 2—Tafel's Location of the Pitch Line

G. B. W.

The Ronalds & Johnson Company, manufacturer of plumbers' supplies, has changed its name to the J. D. Johnson Company, according to action taken at a meeting of the stockholders on October 2. This company has a New York office at 24 Cliff street, with branches in Brooklyn, Philadelphia, Camden and Long Island City.

At the recent annual meeting of the Superior Metal Products Company, Elyria, Ohio, H. A. Jackson was re-elected president and general manager; H. B. Wick was elected vice-president, and A. E. Adams was re-elected secretary and treasurer. H. C. Eckenroad succeeded D. S. Troxel as director.

The Cotton-Tie Scarcity

Inquiry Into the Cause of the Scarcity and the High Price of Cotton Ties

WASHINGTON, D. C., October 28, 1913.—The Department of Commerce has filed with the Senate a report on cotton bagging and ties, the Senate having passed a resoluton directing an investigation into their advance in price. This is the first report of the Bureau of Foreign and Domestic Commerce in its capacity as a tariff board, and it shows that the price of bagging and ties is due entirely to demand and supply and that the tariff has nothing to do with the situation. The report of the bureau with regard to cotton ties is in part as follows:

Cotton Ties Described

A cotton tie is a hoop rolled to a certain gauge and length and having buckles adjusted to the tie for the purpose of baling the cotton. Cotton ties are made by mills which also make steel hoops, ⅜ in. to 3 in. wide and 1/40 in. to 1/10 in. thick, for use in the manufacture of barrels, buckets, etc.; light bands, ⅜ in. to 6 in. wide and ⅛ in. to 3/16 in. thick, for wooden tanks, vehicles, cars, etc., and similar products. Concerns making cotton ties claim that there is more money in manufacturing the other types of hoops and bands, and this is given as the reason why two of the mills made no ties this year, with the result that there is a shortage. The president of the Carnegie Steel Company states that it also makes a larger profit on other types of hoops, but that some one has to make cotton ties and that though there is now a shortage it expects before the end of the season to make enough to fill the requirements of the year's crop.

The cotton ties used in the United States for baling cotton are plain steel strips about ⅞ in. wide, and with a thickness of 19 Birmingham wire gauge, equal to 0.042 in. and about 11½ ft. long. With each tie is a flat steel buckle, rectangular in shape, with a rectangular opening punched out of the middle and an opening at one side. The ends of the ties are bent back after being passed through this buckle and are held in this way. After the tie is rolled it is dipped in tar to prevent rusting. Six ties are required for each bale at the gin, and when the bale is compressed to a smaller size the ties are cut and riveted together to make seven or eight, so that the same weight of ties is used on both square and compress bales. Each tie weight 1½ lb., so there are 9 lb. of steel ties on each bale.

Ties are put up and sold in bundles of 30 (sufficient for five bales) and prices are quoted on this basis. A bundle of 30 ties weighs 45 lb.

Consumption and Production in the United States

The ordinary cotton crop now averages about 12,000,000 bales and for this there are needed 72,000,000 ties, or 2,400,000 bundles, while the record crop of about 16,000,000 bales required some 96,000,000 ties, or 3,200,000 bundles.

The concerns making cotton ties in the United States, together with their ordinary annual output, are as follows:

Company	Location	Bundles
Carnegie Steel Company	Pittsburgh, Pa.	1,500,000
*Pittsburgh Steel Company	Pittsburgh, Pa.	300,000
*Sharon Steel Hoop Company	Sharon, Pa.	100,000
Atlanta Steel Hoop Company	Atlanta, Ga.	300,000
Connors-Weyman Company	Helena, Ala.	150,000

*Making none this year.

It is estimated that ordinarily there are used some 300,000 bundles of second-hand ties that are sold by the cotton mills, and these, with the output of new ties above stated, make up the bundles ordinarily required.

The deficit in the supply of cotton ties this year caused by the failure of the Pittsburgh and Sharon companies to manufacture any will be made up partly by an increased output by the Carnegie and the two Southern companies and partly, probably, by a much larger use of second-hand ties.

The import of cotton ties into the United States is entirely negligible, and even of the small amounts imported a portion is probably for other purposes than baling cotton.

Output and Prices of Carnegie Steel Company

The Carnegie Steel Company, which is a subsidiary of the United States Steel Corporation, furnishes the following statement of cotton ties made by it since 1901:

Year	Number of bundles delivered to customers	Number of bundles on hand or carried as of Jan. 1	Yearly selling price per bundle f. o. b. Pittsburgh
1901	1,712,133	(*)	$0.72
1902	1,499,449	(*)	.80
1903	1,168,496	(*)	.85
1904	1,504,786	439,242	.75
1905	1,249,491	295,511	.85
1906	1,607,688	482,692	.85
1907	1,329,954	213,536	.95
1908	1,470,649	285,772	.85
1909	1,663,291	43,243	.70
1910	1,199,116	551,718	.75
1911	1,578,462	602,786	.75
1912	1,550,342	254,786	.70
1913	†1,900,000	177,132	.80

*Not recorded.

†This is the number of bundles that the company intends to make this year.

The record high price was 95c. a bundle in 1907 and the price this year is a normal one, 80c. a bundle. The company claims that the high price at which ties are selling in the South today (August, 1913) is not due to the primary price, but to the fact that there is a shortage of supply due to the failure of the Pittsburgh and the Sharon companies to manufacture this year, and that though the Carnegie Company has not taken advantage of this situation Southern jobbers are using the temporary shortage to boost their prices and make excessive profits in handling.

It is not probable that a high duty or no duty at all will make the slightest difference in the import of ties, for the distance from the foreign mills and the low cost of manufacture in American steel mills practically prohibit competition unless the prices are pushed up to a much higher level than has yet prevailed. The Carnegie Steel Company now ships some 5000 tons of steel ties a year to India for use in baling cotton, and also supplies some cotton ties to Egypt.

The following table furnishes a comparison of the prices quoted by the four companies manufacturing cotton ties and by Warren, Jones & Gratz, St. Louis.*

Year	Carnegie	Atlanta	Connors-Weyman	Sharon	Warren, Jones & Gratz
1909	$0.70	$0.71	$0.742	$0.65	$0.66
1910	.75	.78	.841	.73	.71
1911	.75	.82	.843	.73	.73
1912	.70	.75	.885	.67	.68
1913	.80	.96	.975	..	.80

The comparison in the preceding table shows the Sharon Steel Hoop Company quoting the lowest prices, while the highest prices shown are of the Connors-Weyman Company. It will also be noted that the prices of the Atlanta Steel Hoop Company are considerably higher than those of Warren, Jones & Gratz. Both the Atlanta Company and the Connors-Weyman Company are comparatively small concerns, and their cost of manufacture is undoubtedly considerably higher than that of the Carnegie Steel Company.

Cause of Shortage

There has been a marked shortage in ties this year (1913), and this fact more than any other has caused the prevailing high price. The failure of two companies which heretofore had turned out part of the ties necessary for baling the crop to roll any ties this year has been a factor in this shortage. The large crop of cotton during the past two years has also been a factor, as the supply of ties was about consumed and the manufacturers faced the coming crop with very few ties on hand with which to satisfy the early demands. Warren, Jones & Gratz, sole agents for the Carnegie Steel Company, were offering no ties during part of August and early in September, and dealers and the smaller mills rolling ties took advantage of the shortage to advance prices. Mills in Birmingham, Ala., and Atlanta, Ga., were quoting ties at $1.20 and $1.25 per bundle, f.o.b. the two cities named. By the middle of September the Carnegie Steel Company,

*It will be noted that in the prices as furnished by the two concerns the quotations of Warren, Jones & Gratz, sole agents for the Carnegie Steel Company, are lower than the average yearly prices stated by the latter firm for the various years.

through Warren, Jones & Gratz, was again offering ties and the two mills mentioned above reduced their price.

The shortage in new ties also caused the price of second-hand ties to go up and in certain instances the market advanced from 75c., the opening price, to 96c. per bundle.

It was stated by one of the independent concerns manufacturing ties that the practice of the Carnegie Steel Company opening the market late in the season at the same time the American Mfg. Company names the price on bagging, has much to do with the shortage of ties, as the independent companies are afraid to make up a large stock, for if the opening price of the Carnegie should be very low the independent manufacturers would be forced to sell at a loss.

In every section visited dealers complained that they were unable to secure ties in sufficient quantities to supply their trade and some were unable to secure any ties at all. In the Southeast the shortage was met, in a measure, by the use of second-hand ties and by the manufacturers in Birmingham and Atlanta, but on account of high carrying charges and the demand nearer home few of these ties got into the Southwest, and there was a greater shortage in this section than in the eastern part of the cotton belt.

Dealers paid for ties delivered in Memphis, Tenn., 93c. per bundle; in Little Rock, Ark., from 94c. to 96c.; in Dallas, Tex., from $1.04 to $1.40; in Augusta, Ga., from 95c. to $1.2405; in Charleston, S. C., from 93c. to $1.25. In each instance the high price was that of an independent mill. In North Carolina the price was from 90c. to $1.25.

From information secured from a considerable number of ginners it was found that the average price paid per bundle for ties was $1.147; the highest price paid by those reporting was $1.56, and the lowest was $1.04. These prices represent new ties. In the Southeast ginners or farmers who bought second-hand ties paid from 75c. to $1 per bundle.

Very few ties are sold directly to the consumer by the manufacturer. In the Southwest large wholesale grocers generally handle ties and sell to cottonseed oil concerns and country stores or ginners. Small ginners or farmers who buy bagging and ties in less than carload lots generally buy from a local store or dealer. In the Southeast the method of distribution is somewhat different. Wholesale grocers do not handle bagging and ties to the extent that these firms do in the Southwest. Cotton-seed oil companies and local dealers handle most of the ties in this territory. Dealers in second-hand ties sometimes sell direct to the ginner, but this is an exception to the general rule. Most of these ties, as is the case with new ties, are handled by local dealers.

Trade Publications

Drill Chucks.—Jacobs Mfg. Co., Hartford, Conn. Catalogue. Points out the improvements which have been made in the latest type of drill chuck and shows the various sizes and styles in which it can be supplied. Instructions for taking the chuck apart are given, together with sectional views showing the construction.

Engine Governors.—Pickering Governor Company, Portland, Conn. Catalogue No. 19-6. Gives general description and specifications for the Pickering governor, which is made in both vertical and horizontal styles, to adapt it to all types of engines. A repair list, with the various parts numbered, together with directions for ordering, is included.

Lever Shears.—Thomas Carlin's Sons Company, 1600 River avenue, Northside, Pittsburgh, Pa. Catalogue. Devoted to a line of lever shearing machines, for use in rolling mills, forge shops, scrap yards, etc. These can be furnished for either belt, motor or steam engine drive, in either right or left hand types. A separate page is given to each of these machines, with an illustration and condensed table of specifications.

Punching and Shearing Machinery.—Wiener Machinery Company, 50 Church street, New York City. Pamphlet. Calls attention to a number of different types of punching and shearing machines that are built with steel frames for handling all classes of work. The machines, which are arranged for hand, belt or electric motor drive are all illustrated and briefly described. Among the machines listed is a quadruple combination machine for splitting plates; cutting-off rounds, squares and flat bars; mitering angles and tees, both right and left to any degree, and punching the webs and flanges of plates and structural material without change of tools. An illustrated description of this machine appeared in *The Iron Age*, July 10, 1913.

Industrial Engineering.—Dodge & Day, 608 Chestnut street, Philadelphia, Pa. Collection of pamphlets. Treat of a number of typical building operations which this firm has supervised. Some of the work which this firm is prepared to do in the planning and building of industrial plants and the preparation of routing diagrams in existing plants are touched upon, and suggestions for the operation of machine tools and metal working plants to secure the maximum output are given.

Rotary Steam Engine.—Augustine Automatic Rotary Engine Company, 1862-1880 Elmwood avenue, Buffalo, N. Y. Booklet. Illustrates and describes the Augustine, automatic rotary engine, which was illustrated in *The Iron Age*, July 10, 1913. The special feature of this engine is the use of a cylindrical piston, carrying sliding blades. Mention is also made of a number of uses of the engine, such as the driving of centrifugal pumps, fans and blowers, automatic stokers and mixing machinery.

Contractors' Machinery.—T. L. Smith Company, Majestic Building, Milwaukee, Wis. Several catalogues. Relate to various types of contractors' machinery, which include concrete mixers and mixing plants, rock, ore and gravel handling machinery and crushing equipment. Only one line is covered in each catalogue, and in addition to illustrating and describing the different pieces of machinery, dimension diagrams and condensed specification tables are also given.

Air Compressors.—Union Steam Pump Company, Battle Creek, Mich. Bulletin D.A.C.-7. Illustrations and descriptive matter explain the operation of a line of duplex air compressors which are built for both steam and belt drive. The constructive features of the compressors are briefly touched upon, followed by specification tables of the different types of compressors. Directions for installing the compressors are given. A list of parts numbered to facilitate the ordering of repairs and a number of tables of useful information are included.

Bronze, Iron and Wire Work.—Cincinnati Mfg. Company, Cincinnati, Ohio. Catalogue No. 39. Practically all of the catalogue is composed of illustrations of the various types of bronze, iron and wire work, such as doors, wickets, grilles, railings, folding gates, window guards, elevator enclosures, etc., which can be supplied.

Safety Spectacles.—T. A. Willson & Co., Inc., Reading, Pa. Booklet. Calls attention to a safety spectacle which is made in a number of different styles for use in foundries, machine shops and factories of all kinds. Among the special features claimed for the glasses are the use of an adjustable bridge and a safety flange, which tends to throw the glass outward in case of breaking instead of permitting it to go through into the eye. A description of the glasses is given, together with a number of illustrations showing the various types of spectacles and how they are used.

Centrifugal Pumps.—American Well Works, Aurora, Ill. Bulletin No. 124. Describes and illustrates a line of centrifugal pumps which have become standardized through extensive use. The bulletin for the most part is made up of halftone engravings of the various pumps, with brief text descriptions of the special features of the different types. A number of tables giving dimensions of the various pumps are included. In addition to these standard pumps, which can be supplied for electric motor, steam turbine and belt drives, special types can be built to meet peculiar conditions.

Water Filter.—Berkefeld Filter Company, 4 Cedar street, New York City. Catalogue No. 12. Describes a line of water filters for residence, laboratory and industrial plant use. The way in which the various types of filters operate is gone into in considerable detail, and a number of testimonial letters are included.

Pumps.—Weber Subterranean Pump Company, 90 West street, New York City. Pamphlet. Shows how a subterranean pump, which is placed at the bottom of the well can be used for supplying factories, mills, etc., with water or for keeping mines and quarries drained. The complete installation consists of a pump, with the necessary fittings, a motor, an air compressor and receiver and the necessary air and water pipes, the pump being started or stopped by the pressure in the air receiver. The various parts are all illustrated and described at some length, and a table showing the size of air receiver required for various lifts is included.

Industrial and Contractors' Equipment.—Ohio Ceramic Engineering Company, Cleveland, Ohio. Catalogues Nos. 10 and 12. The first covers a line of industrial equipment, which includes cars of all types and track, with illustrations and tables of dimensions, capacities, etc. The second is concerned with a line of contractors' equipment, all of which is illustrated and briefly described. A feature of this catalogue is a series of drawings, showing suggested arrangements of the equipment and views of it in use.

Welded Flanges and Pipe Bends.—Ballwood Company, Elizabethport, N. J. Booklet. Contains numerous illustrations with brief descriptions of the various types of welded flanges and pipe joints which can be supplied.

The Machinery Markets

Conservatism in buying machine tools is still widespread. The demand for other classes of machinery, while slower, has not eased off to the same extent. Generally there is little or no change to be recorded and the feeling is that no material alteration in conditions may be expected until various questions, such as that pertaining to currency, have simmered down. New York continues quiet, although the past week brought a slight improvement in inquiries of small and moderate size. The output of machinery in New England has slowed down and the opinion is that the next few months will be a period of readjustment. In Philadelphia new business has been on a comparatively small scale. In Cleveland there have been a few bright spots, such as the call for hydroelectric and mining machinery, but the general market is dull and the jobbing foundries are quieter. The tariff has not yet made necessary any readjustments on the part of the Cincinnati machinery manufacturers, but like others they are feeling the conservative tendency on the part of buyers. Detroit received a slightly better volume of small orders, but the aggregate of trade is hardly improved. A good feature in Chicago is some contemplated buying of shop equipment by the Nickel Plate Railroad, but the trade is dull. Milwaukee machine tool manufacturers are receiving scattered new business and are not complaining though money is tight and collections slow. Conditions are not so favorable in the Central South where bankers are urging their customers to proceed conservatively. Business has been reasonably good in St. Louis and it is felt that a settlement of pending legislative questions would at once start excellent activities and bring out large lists which now are lacking. In Birmingham the demand for heavy machinery and machine tools is less at this time than it was a year ago, though general equipment, which may be classed as machinery, is still moving well.

New York

NEW YORK, October 29, 1913.

Business continues quiet and without much change. Some selling forces have noticed a slight improvement in inquiries, but none of them is of large size. Sales have been widely scattered and made usually from old appropriations, or to fill a pressing want. An occasional order is given by the railroads. The trade looks for the issuance toward the end of the year of two or three good lists of machine tools, although the installation of some of them may not take place until spring. A large part of the trade was surprised and disappointed over the failure of the Standard Roller Bearing Company, Philadelphia. The list of creditors will include a number of machine tool houses. It is generally hoped that the company will be reorganized and continue in the field, not only because it has been a liberal buyer of tools, but also because the trade fears the damaging effect of the large amount of machinery which would be thrown on the market in case of a receivers' sale.

The week was made quieter locally by the annual convention of the National Machine Tool Builders' Association held in this city. It was attended by many salesmen as well as executives. As usual, many of the manufacturers did not depart for home immediately after the convention, but stayed over until this week for the purpose of conferring with their local managers and the dealers who represent them in this territory. The presence of the tool builders last week was felt in an increased attendance at the Machinery Club. On October 24, the club at 50 Church street cared for 478 members and guests at luncheon. Several of the visiting machinery men took advantage of the opportunity of visiting the New York Business Show which was held last week in the Sixty-ninth Regiment Armory. The exhibit included many time-saving devices for office work and accounting. The Gisholt Machine Company, Madison, Wis., exhibited the Periodograph which it developed for finding costs in its own factory and is now manufacturing in a department of its plant created for the purpose.

The Eagle Metal & Supply Company, Brooklyn, N. Y., manufacturer of iron and steel pipes, etc., has purchased the property of the Morris Iron Company at Elizabethtown, Pa. The former company is not yet ready to make use of its new acquisition and no details are as yet available.

Rouse & Goldstein, 38 West Thirty-second street, New York, are the architects for a large plant which the Fulton Bag & Cotton Mills, Atlanta, Ga., will erect in Brooklyn early next year.

A factory building, 80 x 150 ft., will be erected for the manufacture of milk chocolate by Pickman Bros. at Pawling, N. Y., upon a site recently acquired. The estimated cost is $50,000.

The Dutchess Mfg. Company, Poughkeepsie, N. Y., is building an addition to its plant for the manufacture of overalls and clothing.

The Warm Hand Steering Wheel Corporation, Poughkeepsie, N. Y., has been incorporated with a capital stock of $150,000 for the manufacture of steering wheels for automobiles, etc., and will equip a manufacturing plant. G. E. Smith, W. S. Barton and J. C. Barton, 1324 Seventy-third street, Brooklyn, N. Y., are the incorporators.

The Herbert Brush Company, Kingston, N. Y., has let contract for erection of a brush manufacturing building, 45 x 90 ft., with dry kiln.

The Gifford-Wood Company, Hudson, N. Y., will build a one-story addition, 75 x 150 ft., of brick and steel, to its manufacturing plant.

The Handlor Company, Hudson, N. Y., has completed plans for a manufacturing building, 72 x 152 ft., one-story, which it will erect at once. A. Gifford is president of the company.

The Morrow Mfg. Company, Syracuse, N. Y., has completed plans for a machine shop, 34 x 100 ft., three-stories and basement, which it will add to its plant for the manufacture of automobiles.

The Lock Insulator Company, Victor, N. Y., has commenced construction of a 72 x 150 ft. addition to its plant.

The Adriance Machine Works, Inc., Frankfort, N. Y., has been incorporated with a capital stock of $200,000 to manufacture machinery, tools and hardware, and will equip a plant. Benjamin Adriance, of Brooklyn, and Charles T. Titus and R. L. Kinne, of Utica, are the incorporators.

A gas plant to cost $40,000 is to be built on Sconondoa street, Oneida, N. Y., by the Adirondack Electric Power Company. L. B. Bortin is superintendent.

The citizens of Arkport, N. Y., have voted to issue bonds for the construction of a water works system.

The board of supervisors of Schenectady County, Schenectady, N. Y., is receiving sealed proposals for the construction of a pumping station at the County Tuberculosis Sanatorium. Bernard A. Farrell is clerk.

The plant of the Frewsburg Canning Company at Frewsburg, N. Y., was destroyed by fire October 22, with a loss of $25,000 on building and machinery. It is stated that the plant will be rebuilt, but possibly not until next year.

The Niagara Falls Furnace Company, Niagara Falls, N. Y., is erecting a plant on the east side of the Erie Railroad near Twenty-second street, which it expects to have in operation before December 1. The company has also taken over the Fremont Furnace Company, Fremont, Ohio, and will manufacture the furnaces made by the latter company. A. V. Davidson is president of the Niagara Falls Furnace Company.

The Union Carbide Company, Niagara Falls, N. Y., is making further extensive additions to its plant. Five buildings will be erected, to cost approximately $750,000.

The Niagara Falls Knitting Company, Niagara Falls, N. Y., will erect a new factory building. Plans are being prepared.

H. A. Beals, C. J. Peters and G. L. Reichart, Buffalo, N. Y., have incorporated the Universal Calculator Company with a capital stock of $35,000 to manufacture mechanical devices.

The Charles M. Bott Furniture Company, Buffalo, will build a boiler house and two dry kilns at its new plant at East Ferry street and the Erie Railroad.

New England

BOSTON, MASS., October 28, 1913.

The convention of the National Machine Tool Builders' Association in New York, last week, afforded an exceptional opportunity for an analysis of business conditions as they affect the trade. To make the source of information more complete the dealers were largely represented in the general gathering, their association meeting at the same time and in the same hotel.

To summarize opinions, hopeful or otherwise: Business was exceedingly good in most machine tool lines in the first six months of the year, and fell off sharply in the summer, and has not revived with the approach of cold weather. Most of the builders have laid off men or shortened working hours. The dealers are more cheerful than the manufacturers. Few men in the trade see any serious depression ahead. The remainder of the year will be included in a period of readjustment, which, by the way, is not blamed on the new tariff. The financial situation, the currency bill and the very conservative attitude of the banks as to loans came in for the large share of the blame. The great quantities of second-hand machinery now being absorbed, or promised for absorption, were not forgotten in the discussions. Increasing inquiries were cited by some of the builders and dealers. If any feeling of real despondency existed it was thoroughly concealed. To put it briefly, the market has slowed down, in common with that for many other lines of manufactured products. On the other hand, not a few users of machine tools are busier than the machine tool builders.

The Washington Mills, North Grafton, Mass., manufacturer of emery products, will build an addition, 55 x 60 ft., two stories.

That the textile industry is not disheartened by the new tariff is indicated by plans for extensions, announced or yet to be announced. From New Bedford, Mass., comes word that two new cotton mills are to be established. The plans for one of them are taking definite form, while those for the other are still in embryo. Various established mills are either extending or are making plans for additions later.

The plant of the American Enamel Company, Providence, R. I., which was burned several months ago, will be rebuilt. The main building will be 108 x 139 ft., with two ells, 42 x 82 ft., and 25 x 75 ft.

The Peabody Leather Company, Peabody, Mass., plans to erect a factory.

The Continuous Zinc Furnace Company, Hartford, Conn., which has developed a continuous process for smelting zinc ore electrically, has increased its capital stock from $25,000 to $1,000,000. The Stevens-Fitch Company, New Haven, Conn., has incorporated under a Connecticut charter, with $50,000 capital, to manufacture electrical devices. Another new Connecticut corporation is the Tolometer Company, Bristol, which will manufacture time clocks and similar apparatus. The incorporators are Anson T. McCook, John H. Buck and I. H. Nichols, all of Hartford, and the capital stock is $50,000. The Arena Centerfreeze Company, New Haven, Conn., will manufacture ice-making equipment. The capital stock is $500,000, and the incorporators are George G. Powning, William G. Powning and Benjamin F. Miller, all of New Haven.

Philadelphia

PHILADELPHIA, PA., October 27, 1913.

New business has been on a comparatively small scale, buyers continuing to show little interest. Tool manufacturers are receiving a moderate amount of general business, although orders credited to this immediate territory are light. The second-hand machinery market continues dull. Moderate power plant equipment is in fair demand. Foundries, particularly those making gray-iron castings, are fairly well engaged, although some find the demand for machinery castings lighter. Steel casting plants are, in instances, somewhat more busy.

The W. E. Shipley Machinery Company, which for 16 years has been located on the machinery floor of the Philadelphia Bourse, where an extensive display of machinery was made, will discontinue the display on November 1, and take office quarters in suite 1409, Morris Building, maintaining a warehouse for the storage of machine tools for quick delivery at 1608 Carlton street.

The Franklin Metal Bed Company, of this city, has been incorporated with a capital stock of $10,000 to manufacture metal furniture by John Knoell, George Knoell and Samuel I. Segal. Plans of the company are not available.

The Delta File Works, Frankford and Allegheny avenues, has purchased additional property, 40 x 112 ft., adjoining its plant, on which is to be erected an addition to be used for the extension of its file cutting and forging departments.

W. A. Drysdale, Land Title Building, has completed plans and will, it is said, be ready shortly for estimates for the installation of a new cold storage plant in the State Hospital for the Insane, Morristown, Pa.

The Kensington Hygienic Ice Company is reported to be contemplating large additions and alterations to its plant at 218 East Huntingdon street, this city. Plans are expected to be completed in the near future.

Sauer & Hahn, engineers, are preparing plans for a mill building, 70 x 200 ft., and a power plant to be erected at Main and Carson streets, Manayunk, for the A. T. Baker Company, textile manufacturer. The main building will be four stories and of reinforced concrete construction, with metal sash. Specifications for the building and power plant equipment are expected to be ready for estimate in three weeks.

Local contractors are figuring on plans for a three-story factory building, 50 x 140 ft., of slow burning construction type, to be erected for the Progressive Knitting Mills, Royersford, Pa.

The Myers Machine Tool Company, Columbia, Pa., has been incorporated with a capital stock of $50,000.

Reports in the daily papers that the Reading Iron Company, Reading, Pa., would make improvements to its Oley street mill, installing facilities for the making of steel billets, are denied by officials of the company.

Chicago

CHICAGO, Ill., October 27, 1913.

The general machinery demand shows no material improvement and few of the scattered projects are coming to a head. The Nickel Plate Railroad is figuring on the machine tool equipment for a new machine shop, but other railroad inquiry is almost entirely lacking. At East St. Louis the railroad terminals were recently destroyed by fire and some replacement purchases may be expected there. The situation as regards the railroads is not without its hopeful aspects, for much comfort may be taken from the evidences of activity in the acquisition of new rolling stock. A clearing up of some of the troublesome measures which have been casting a spell of conservatism over business will be followed by a widespread railroad financing already forecasted in the pretentious programme of the Pennsylvania Lines.

The plant of the Redlich Mfg. Company, cork manufacturer, 637 West Oak street, Chicago, was damaged October 16, to the extent of $4000 by fire.

The Acme Supply Company, 326-30 North Leamington avenue, Chicago, will erect a one-story foundry building to cost $11,000.

The Quaker Oats Company, Chicago, has let the contract for a two-story brick warehouse to be erected at 1546 South Dearborn street, at a cost of $20,000.

The Commonwealth Edison Company, Chicago, will erect a one-story brick sub-station, 74 x 93 ft., on East Sixty-second street, at an estimated cost of $33,000; also a sub-station, 55 x 94 ft., on South Hermitage avenue, to cost $28,500.

The Bell & Howell Company, 1803 Larchment avenue, Chicago, has let the contract for the erection of a two-story brick factory, 75 x 120 ft., at a cost of $20,000.

The Gary Packing Company, Gary, Ind., has let the contract for the first unit of a large warehouse to Charles C. Cronin, at a cost of $10,000. When completed the plant will occupy a site of about two acres.

The Cotta Gear Company, Rockford, Ill., has been incorporated with a capital stock of $10,000 by Charles and L. P. Cotta and H. B. North, and will equip a manufacturing plant.

The Shoemaker Incubator Works and the Peerless Machine Works, Freeport, Ill., were destroyed by fire October 21, with a loss of about $40,000. It is understood that both plants will be replaced.

The Streator Ice & Cold Storage Company, Streator, Ill., has been incorporated with a capital stock of $30,000 by R. H. and E. M. Schurman and Joseph Kopf and will equip a plant.

The Farmers' Elevator Company, Manteno, Ill., has been incorporated with a capital stock of $15,000 by A. G. Dicus, George H. Farrant and William A. Carroll and will equip a grain elevator.

Plans for a new electric light plant for the village

of Manito, Ill., have been completed by Reeves & Baille, architects, Peoria.

The National Tube Company has appropriated $14,000 for improvements in its works at Kewanee, Ill.

The Springfield Bridge & Iron Works, Springfield, Ill., has been sold to Miller & Wayne, of Monmouth, and the property will be made a nucleus for a larger plant by the new owners.

The two buildings of the Quinn Wire & Iron Works, manufacturer of hardware specialties, Boone, Iowa, were destroyed by fire October 11. The loss was nearly covered by insurance and the company will rebuild at once, expecting to be in operation within five weeks. The company advises that some machines and foundry equipment will probably be required, but definite plans are not yet made. W. W. Quinn is president and C. C. Quinn, secretary and treasurer.

The American Cement Machine Mfg. Company, Madison, Wis., will make Keokuk, Iowa, its headquarters in the future.

The Central Foundry Company, Marshalltown, Iowa, has been incorporated with a capital stock of $6000 to conduct a foundry and machine shop, making a specialty of soft gray-iron castings. The president and general manager is R. H. McDowell; secretary and treasurer, E. H. Keller. The directors are R. H. McDowell, E. H. Keller and Thomas Kopp. The company will be in the market for various machine tools.

Edgewood, Iowa, has voted a $12,000 issue of bonds for an electric light plant.

Gliddon, Iowa, has voted a $10,000 issue of bonds for extending the electric light facilities.

Lenox, Iowa, has authorized a $32,000 bond issue for the installation of waterworks.

The Western Rug Company, West Duluth, Minn., will award the contract this week from the office of the architect, Anthony Puck, for its new factory, which is estimated to cost $50,000.

Auburn, Neb., has voted a $12,000 issue of bonds for the installation of a municipal light plant and for the enlargement of the present waterworks system.

The city of North Platte, Neb., is to have a new water power and electric plant, work on which has begun under the direction of Willis Todd, of Omaha.

The Town Council of Harlem, Mont., has appointed a committee to take estimates on an electric light plant.

The Atchison, Topeka & Santa Fé Railway will build a concrete machine shop at 2500 East Sixteenth street, Los Angeles, Cal., to cost $12,500.

Indianapolis

INDIANAPOLIS, IND., October 27, 1913.

The Briskin-Wolsiefer Mfg. Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture auto parts by J. H. Briskin, C. C. Wolsiefer and H. W. Bullock.

The main building of the new foundry of the Crawford & McCrimmon Company, Brazil, Ind., will be 80 x 285 ft., of steel, brick and glass. The machine shops are rapidly nearing completion. Electric cranes are to be part of the equipment of the new plant.

The Bowman-King Stone Company, Bloomington, Ind., has been incorporated with $10,000 capital stock to quarry stone by P. R. King, H. S. Bowman and E. K. Bowman.

The Richmond Commercial Club, Richmond, Ind., is to raise a factory fund of $100,000 to purchase sites and offer other encouragement to new industries. Charles W. Jordan is secretary of the club.

The Inner-Braced Furniture Company, Elkhart, Ind., has been incorporated with $150,000 capital stock, to manufacture furniture. The directors are Burton D. Nichols, M. S. Nichols and John Stewart.

The Western Launch & Engine Company, Michigan City, Ind., has been sold at receiver's sale to William Miller, one of the stockholders. The company manufactures yachts and marine engines.

F. J. Scholz & Son, Evansville, Ind., have been incorporated with $50,000 capital stock, to operate quarries by F. J. Scholz, H. J. Karges and C. J. Scholz.

The Standard Lime Fertilizing Company, Covington, Ind., has been organized with $100,000 capital stock to establish a crushed lime factory by E. E. McKee, Chas. L. Irwin and William M. Dye.

The Memphis Iron & Metal Company, New Albany, Ind., has filed notice of dissolution.

J. H. Rohsenberger and others have taken an option on an abandoned cotton mill plant at Evansville, Ind., with the purpose of converting it into a chair factory.

The Goshen Mfg. Company, Goshen, Ind., which has just completed the erection of a new building, is planning the construction of another factory building next year.

Milwaukee

MILWAUKEE, WIS., October 27, 1913.

Some scattering new business of the small variety has helped to sustain the market, but on the whole the situation is slowly becoming less satisfactory. Buying is spotty and is only for immediate needs. The Allis-Chalmers Mfg. Company has recently booked several fair contracts for power units and electrical equipment and is maintaining good production. The machine tool builders are not complaining as yet. Money is tight and collections are slow. Working forces are being kept intact except in a few cases.

The report that the Allis-Chalmers Mfg. Company intended to move its Reliance works in Milwaukee to West Allis and dispose of the ground to a railroad company is denied at the Allis-Chalmers general offices. It is stated that while the company is endeavoring to concentrate its productive activities at the main works in West Allis, the Reliance shops are too valuable and too well situated to make abandonment advisable. They are devoted principally to foundry purposes and are melting as high as 300 tons a day. The company has recently booked some excellent power unit orders, among the latest being one for a 6000 kw. generator set for the Cambria Steel Company, Johnstown, Pa.

The 6000 employees of the West Milwaukee locomotive and car shops of the Chicago, Milwaukee & St. Paul Railway Company have been placed on a straight 8-hour day basis. The various departments have been on a 10 and 9-hour basis during the busy season. No reductions have been made in the working force.

The plant of the Fish Bros. Wagon Company, Racine, Wis., at one time among the largest of its kind in the West, has been sold to the Howell Realty Company. Part of the plant has been leased by the J. I. Case Threshing Machine Company for storage and yards.

The Whitney Boiler Works Company, Superior, Wis., incorporated with $40,000 capital, has organized with W. A. Whitney, president of the United States National Bank, as president; E. H. Whitney, vice-president, and W. M. McKenzie, secretary-treasurer. The company has taken over the properties of the National Boiler Works and intends to make extensive improvements and enlargements. N. A. Ryan, head of the National works, will be associated with the new company as general superintendent and factory manager. It is reported that the company will enter the structural and machinery field next spring.

The Ventilating Closet Seat Company, Wausau, Wis., has been organized by Fred Lavenhagen, Samuel Livingston, Max Tisch, F. O. Crocker and A. H. Halder to manufacture plumbers' supplies and materials. The capital stock is $15,000.

The Farmers' Federated Warehouse Company, Plymouth, Wis., is erecting a cold storage plant. Two buildings will be erected, namely, a power and refrigerating machine house, 40 x 70 ft., and a warehouse, 70 x 118 ft. The project involves $25,000.

The Kissel Motor Car Company, Hartford, Wis., is installing new electrical and power equipment which will increase the aggregate capacity of its main works at Hartford by 500 hp. The generators, etc., are being furnished by the Allis-Chalmers Mfg. Company.

B. Elroy Bauer, Elroy, Wis., has disposed of his half-interest in the Elroy Machine Works, including the garage business, to his partner, Roy Gibbens. Mr. Bauer will engage in the same business at Sterling, Kansas.

The Harvey Forging Company, Racine, Wis., has filed notice of dissolution as a corporation. Several months ago the owners organized the Harvey Spring Company, and built a large new plant for the production of drop forgings and springs for all kinds of vehicles.

The Turner Mfg. Company, Port Washington, Wis., formerly the Western Malleable & Grey Iron Company, now manufacturing small gasoline engines, is operating night and day, due principally to the rush of Canadian and foreign business. It is possible that the 24-hour workday will be effective throughout the winter months.

The Great Northern Railway has decided to proceed with the construction of a steel grain-handling plant and elevator at Superior. The structure will be situated south of Elevator S and will be practically a duplicate, having a capacity of 4,500,000 bu.

Detroit

DETROIT, MICH., October 27, 1913.

No real improvement is noticeable in the machinery trade. The volume of sales reported is slightly greater than that of the preceding week, but orders were confined almost entirely to single tools. No new lists of importance are before the trade. Manufacturers for the most part continue well engaged, but no active stimulus to conditions which would warrant any extension of facilities beyond the bare needs of the present is in sight. Second-hand machinery dealers report the trade slow, and that a large stock of equipment is on hand. A greater activity has developed along building lines.

Plans have been completed for an eight-story building, of reinforced concrete construction, for David M. Kerr, Detroit. The greater part of the building will be occupied by the Kerr Machinery & Supply Company, manufacturer of steam and electric pumps and steam turbines.

Estimates are being prepared for a large four-story factory building of steel and concrete construction for Dodge Bros., Detroit, manufacturers of automobile parts. The new structure will be devoted in the main to assembly work.

George Thrall, Detroit, manufacturing machinist, has awarded the contract for the erection of a one-story brick machine shop at 807 Scotten avenue.

Plans have been drawn for the Smith-Matthews Foundry Company, Detroit, for a brick and steel building adjoining its present plant, which it is stated will double its capacity. The company, which manufactures a line of contractors' and plumbers' specialties, reports a good volume of business.

The Detroit Drawn Steel Company, Detroit, has been incorporated with $300,000 capital stock to manufacture metal products and machinery. The company is now operating, and no equipment will be required. P. M. Haas and S. C. Leonard are the principal stockholders.

The Eclipse Cutting & Welding Company, Detroit, has been incorporated with $15,000 capital stock to engage in a general metal business. Robert W. Greer and George B. Wootton are the principal stockholders.

H. Little, E. Finkerstead and others, Detroit, have incorporated the Sterling-Detroit Motor Company, to engage in the manufacture of motor vehicles. The company is capitalized at $105,000.

Siewek Bros., 18 Piquette avenue, Detroit, Mich., manufacturers of jigs, dies, tools, etc., and specialists in grinding and designing, advise that they plan to add the following equipment: One surface grinder, one 14-in. x 24-in. lathe, one 12-in. x 18-in. lathe, one 10-in. x 30-in. widened planer, one bench lathe, one vertical milling machine, one 36-in. screw press, and one tool steel treating furnace. Address Alban C. Woodward.

The Saginaw Wood Products Company, Saginaw, Mich., whose plant was burned last spring, has effected a merger with the Eby Mfg. Company, Detroit, manufacturer of automobile wooden ware, and a new plant will be established at Gaylord, Mich.

The Northern Specialty Company, Crystal Falls, Mich., has been incorporated by Samuel Bridges, Ray Kimball and others, to manufacture a crank holder invented by Mr. Kimball.

The Bremer-Wilson Mfg. Company, Benton Harbor, Mich., has increased its capital stock from $150,000 to $300,000.

Cleveland

CLEVELAND, OHIO, October 28, 1913.

A few bright spots appear in a generally dull market. A good volume of inquiries for hydroelectrical equipment and mining machinery is reported, and some inquiries for coal and ore handling equipment are being figured on. The machine tool market continues dull, with little inquiry, and this only for single tools. Reports that are being circulated that a large number of men in the automobile industry are being laid off appear to be exaggerated. However, there has been considerable slowing down in this industry and automobile plants are not as busy as they were a year ago at this time. This condition affects a large number of makers of automobile parts. These look for general holding back of orders in the automobile trade until the first of the year. Jobbing foundry business has quieted down. Conditions in the cast-iron pipe trade show no improvement. James B. Clow & Sons announce that they will shut down their pipe shop at Coshocton, Ohio, October 31, but will keep the remainder of their plant in operation. Generally plants in metal working lines have a fair volume of orders on hand, but new business is light and considerable curtailment in plant operations has been noticeable. As a result there is an increasing number of men, both skilled and common laborers, out of work in this city and vicinity.

The Standard Motor Truck Company, Cleveland, is considering the removal of its plant to Warren, Ohio. It is stated that the Warren Board of Trade will provide a permanent site for the plant, which will be located in Warren provided stock subscriptions to the amount of $10,000 are secured.

The Baxter-Frick Gear Cutting & Mfg. Company, Cleveland, has been incorporated with a capital stock of $25,000, by Archie K. Baxter, William H. Frick and others to manufacture gears.

The Kelly Reamer Company, Cleveland, has increased its common stock from $25,000 to $50,000, to add facilities for its rapidly growing business, which has doubled during the past three months. Practically all of the new issue will be taken by the present stockholders.

The Collinwood Foundry Company, Cleveland, has been incorporated with a capital stock of $10,000 by John Maus, Frank Horn and others.

The Sterling Spring Company, Cleveland, has been incorporated with a capital stock of $150,000 to manufacture automobile springs by F. C. Wood, D. P. Osborne and others.

The Ohio Reamer Company, Cleveland, has been organized by John H. Horsburgh, of the Horsburgh Forging Company, and others to manufacture a new reamer. Definite plans for placing the product on the market will not be perfected until some time has been spent in thoroughly testing the reamer.

The city of Cleveland is in the market for air compressors, freight elevators, steam turbine driven generators and steam engine driven generators and cable to be used in cribs in connection with the building of a new west side water tunnel. Sealed bids will be received at the office of the secretary of the director of public service until November 6.

A plant for the manufacture of incubators is being established by Albert Forney in West Lafayette, Ohio, in part of the building occupied by the West Lafayette Novelty Company. This plant was formerly located in Plainfield, Ohio, but larger quarters were needed.

G. W. Britton has been appointed trustee in bankruptcy of the Attwood Wrench Company, Conneaut, Ohio. The affairs of the company may be straightened out and the operation of the plant resumed.

Sealed proposals will be received by the board of commissioners of the Lima State Hospital, Lima, Ohio, until November 18 for the erection of a water supply system including pumping plant, mechanical equipment, etc. George E. Whitney is secretary of the commission.

Cincinnati

CINCINNATI, OHIO, October 27, 1913.

So far the new tariff law has not made necessary any widespread readjustments with manufacturers in the Central West. However, a general tendency to act conservatively is noticeable, and plans for new plants or additions to existing factories are not numerous. Railroads and automobile manufacturers have also stopped buying machine tools, and at the moment this particular line of manufacture is extremely dull. Although the trade in general anticipates an improvement after January 1, nothing in sight indicates a betterment in business before that date. A number of shops are operating on a five-day basis, and practically all of them have curtailed forces. A little improvement in the second-hand machinery business is reported, and a few of the foundries also report a number of sporadic orders received lately.

The Permuttit Company, New York City and Germany, manufacturer of water softening filters, announces that it will open a Cincinnati branch office within a short time. The company makes a specialty of filters for manufacturing plants.

The Automatic Coin Changer Company, Cincinnati, has been incorporated with $500,000 capital stock, and will locate a factory in Covington, Ky., for the manufacture of coin changers. Nothing is known as to equipment requirements. Ed. E. Walker, Covington, is one of the principal incorporators.

The Central Auto Repair Company, Cincinnati, has been incorporated with $30,000 capital stock, and will establish a repair shop in the downtown district.

Little equipment will be needed, as the company expects to acquire a shop already in operation. The incorporators are George F. Oster, Paul V. Connelly and Samuel Stern.

The American Oil & Pump Company, Cincinnati, whose plans were recently announced, has secured a building at Kindel street and Central avenue, and is now fitting it up for the manufacture of self-measuring tanks and other specialties. Little equipment will be required.

The municipality of Frankfort, Ohio, will soon advertise for bids for additions to its waterworks plant. In the list of equipment that will be required are two elevated tanks of approximately 90,000 gal. capacity.

The Igou Mfg. Company, Springfield, Ohio, will rebuild its plant, recently badly damaged by fire. The company makes a specialty of small automatic machines.

The Klanke Furniture Company, New Bremen, Ohio, will build a furniture factory at Piqua, Ohio, for which equipment will be required. The company's plant at New Bremen was recently mentioned as being destroyed by fire.

Preliminary work has been commenced on the plans for the new waterworks plant at Ironton, Ohio, but it will be some time before bids on equipment necessary will be ready.

The new plant of the American Pad & Textile Company, Chillicothe, Ohio, recently mentioned, will be 50 x 125 ft., one story and basement, of brick and concrete construction. Work has already commenced on the new structure.

The city of Columbus, Ohio, will open bids on November 5 for 200 fire hydrants and a lot of other waterworks specialties. B. L. Bargar is director of public safety.

The municipality of Greenville, Ohio, plans some extensions to its waterworks plant. M. G. Demorest is president of the City Council.

A two-story foundry and machine shop will be built by the Jaeger Machine Company, Columbus, Ohio. The new building will be 60 x 350 ft., of brick.

The Detroit, Toledo & Ironton Railroad Company will rebuild its roundhouse at Springfield, Ohio, recently badly damaged by fire. The company's repair shop was not damaged.

The Central South

LOUISVILLE, KY., October 27, 1913.

Conditions are not so favorable as they have been to the development of new business. Bankers in this and other cities are urging their customers to operate conservatively, and this is having the effect of retarding plans for manufacturing expansion. However, it is believed that business in the South will be less affected by sentiment of this kind than in the Middle West and East. Boiler manufacturers report a falling off in inquiries for the first time in several months. Electrical equipment houses are doing a fair business, however, a number of municipal projects in this section being ready for action.

George W. Cuscaden, Sr., Louisville, has purchased a site on Fifth street, near Green, where he will establish a large ice cream factory.

The Indian Refining Company, New York, which has a refinery at Georgetown, Ky., is establishing an oil storage plant in Louisville. It will require pumps and other equipment.

L. R. Veatch & Co., operating a machine shop for the manufacture and repair of flour milling equipment at First and A streets, Louisville, have filed a petition in bankruptcy in the Federal court. The liabilities are $19,250 and assets $10,828.

Edward Offutt and Clay Combs, Midway, Ky., are in the market for machine tools for an automobile repair shop which they are preparing to equip.

The Commercial Club of Whitesburg, Ky., has taken in hand a project to have a waterworks plant installed and can supply information as to the details of the plan.

W. English Arnold, a flour miller of Owenton, Ky., plans the establishment of an electric light plant in connection with his mill. A 20-year franchise has been given him by the municipality.

The Hodgenville Light Company, Hodgenville, Ky., will be in the market for a boiler, engine and dynamo for its power plant in the next few months. D. E. Paterson is owner of the company.

The Clay Light & Ice Company, Clay, Ky., has disposed of a bond issue for the purpose of adding to the capacity of its ice factory and providing equipment for electric lights, and will make the improvements in the immediate future.

The plant of the Dagg Planing Mill Company, Hopkinsville, Ky., was destroyed by fire October 21. The company is planning to rebuild.

S. M. Mapel & Co., Irvine, Ky., will install a sawmill on a nearby tract of hardwood timber which they recently purchased.

The Peerless Bowling Green Stone Company, Bowling Green, Ky., has been incorporated with $30,000 capital stock by G. B. Brownfield, E. G. Brownfield and T. C. Brownfield and will purchase equipment for operating a stone quarry. T. C. Brownfield is in charge of machinery purchases.

The plant of the Leitchfield Light & Power Company, Leitchfield, Ky., was burned October 23 with a loss of $7500, covered by insurance. The W. C. McChesney Company, which owns the plant, will rebuild at once.

The Paris Water Company, Paris, Ky., has decided on improvements which will cost $200,000. A pumping station costing $150,000 will be built.

John Jamison and C. Snyder will equip an automobile repair shop at Owensboro, Ky. Temporary quarters have been occupied.

The Davis Hosiery Mills, Chattanooga, Tenn., have plans for the equipment of an aditional mill at Ridgedale, Tenn., the machinery, including electric power, being estimated to cost about $40,000.

J. B. Horton will rebuild the grain elevator owned by him at Memphis, Tenn., which was recently burned with a loss of $25,000.

The New Era Machine Works, Nashville, Tenn., has been organized by A. N. Sherg and W. L. Drake, with quarters at 913 Church street. Automobile repairing will be the company's principal business.

The Coulson Lumber Company, Memphis, Tenn., will need tools for a filing-room to be equipped in connection with a new sawmill near Moorhead, Miss.

The Marlbrook Lime Company, Roanoke, Va., will purchase a used boiler and engine, to generate about 40 hp.

Bids will be received by E. A. Darden, secretary of the board of public works, Wilson, N. C., until November 4, for water tube boilers, two 500-kw. units, condensers and a switchboard.

Birmingham

BIRMINGHAM, ALA., October 25, 1913.

While the demand from contractors, mines and other quarters where heavy machinery and machine tools are needed, has fallen under the level of this time last year, the laying in of stocks of standard implements by country merchants is on a liberal scale. Gasoline engines are good sellers. General trade is not active, but underlying conditions continue satisfactory and a healthy volume of business is reported.

The Southern Sash, Weight & Foundry Company, Birmingham, Ala., has been incorporated by S. K. King, J. M. Davis, Oscar D. King and others with a capital stock of $8000.

The Bacon-Underwood Veneer Company, Stockton, Ala., will rebuild its plant, which was recently damaged by fire to the extent of $40,000.

J. W. Adams and others, of Chattanooga, Tenn., are preparing to construct a waterworks and an electric lighting plant at Bridgeport, Ala.

J. A. McCain, of Meridian, Miss., as trustee for Meridian and Mobile men, has purchased 14,000 acres of timber land in Choctaw County, Ala., and will erect sawmills.

The Cochrane Lumber Company will rebuild the sawmill at Toinette, Ala., which was recently burned with a loss of $30,000.

E. L. Fenn, of Cloverdale, Ala., will build a small hardwood plant at Vina, Ala. He has purchased the timber on a tract of 1000 acres.

The Mobile Woodenware Mfg. Company, Mobile, Ala., has been incorporated with a capital stock of $40,000. William H. Cooper is president. G. W. Raines, Henry De Laney and others are interested. H. Parker is constructing engineer. The company will manufacture baskets, shucks, hampers, etc.

Edward S. Jones, Mobile, Ala., is planning the erection of a plant to manufacture a patented cottonpicker.

The Ozark Cotton Mill Company, Ozark, Ala., has been incorporated with $100,000 capital stock and plans to equip a spinning mill. A 400 hp. steam plant will be installed. W. D. McNeill is manager.

The Kyle Cooperage Company, Gadsden, Ala.,

whose plant was destroyed by fire several months ago with $25,000 loss, will rebuild, it is announced.

The W. G. Mitchell Lumber Company, Shortleaf, Ala., will establish a sawmill, besides enlarging the plant, which it is now operating.

The Bridgeport Spoke Works, Bridgeport, Ala., will enlarge and improve its plant. G. W. Williams is manager.

Jordan & Young, Mobile, Ala., will rebuild their turpentine plant, which was recently burned.

Marshallville, Ga., has voted a $15,000 issue of bonds for waterworks and a $5000 issue of bonds for an electric light system.

The Peoples Ice Company, Griffin, Ga., has been incorporated and plans to build an ice factory and cold storage plant.

The Wilkinson Machine Company, Savannah, Ga., will establish an extensive machine shop.

The Palmetto Novelty Works, Palmetto, Fla., has been incorporated with a capital stock of $15,000. Nelson A. Reynolds, C. C. Lazenby and G. W. McClure are interested.

J. W. Harvey and associates, of Pensacola, Fla., are planning to construct a hydroelectric plant at Muscogee, Fla., and propose furnishing power to Pensacola, Mobile and other cities. A concrete dam across the Perdido River is the principal feature of contemplated construction.

The Lawrence Mfg. Company, Key West, Fla., founder and manufacturer of machine fittings and the Lawrence special stuffing box combination lock valve, whose plan to build at once a plant at Punta Gorda, Fla., was reported last week, advises that the following equipment will soon be installed: Two turret lathes, four engine lathes, one shaper, one planer, two drill presses, one pipe cutting and threading machine, two wood turning lathes, one bandsaw, one double-headed milling machine, one brass cupola, one iron cupola and other foundry equipment. John H. Lawrence is president; E. M. Semple, vice-president; A. L. Pendleton, secretary and treasurer.

St. Louis

ST. LOUIS, Mo., October 27, 1913.

The aggregate of business has been reasonably good, all things considered. No untoward symptoms in the market appear and improvement when sentimental ideas with relation to legislation are out of the way is expected. Single tool requests prevail and some replacement work is being done, but no large lists are coming out. Collections are in fairly good shape and second-hand tools are in fair demand.

The Advance elevator of the C. H. Albers Commission Company, St. Louis, located on the east side of the river, was burned October 19, with a loss of $125,000 on building and equipment. The plant will be replaced, it is announced.

The St. Louis Surfacer & Paint Company, St. Louis, whose plant was burned some weeks ago, has completed plans for the erection and equipment of a plant which will cost, with its equipment, about $50,000. It manufactures metal covering paints exclusively.

The city of Maplewood, a suburb of St. Louis, has awarded a franchise for an electric light and power plant to J. M. Gore, representing the Independent Light & Power Company. H. P. Taussig, of St. Louis, and Horace C. Pugh, of Terre Haute, Ind., are interested.

The Acme Fireproofing & Contracting Company, St. Louis, has been incorporated with a capital stock of $10,000 by Sam Lazarus, S. A. Walker, J. D. Fidler and E. H. Wischer, to manufacture and place fireproofing products.

The Becker-Schneple Bakers' Supply Company, St. Louis, has increased its capital from $20,000 to $60,000 for the purpose of enlarging its factory equipment.

The Slip-Not Horse Shoe Mfg. Company, St. Louis, has been incorporated with a capital stock of $12,000 by Edwin Kuechler, Michael P. Daven and Frank W. L. Peebles, to manufacture horseshoes, horseshoe creepers, etc.

The Monarch Metal Weather Strip Company, St. Louis, has increased its capital stock from $75,000 to $100,000 for the purpose of adding to its manufacturing equipment, it is stated.

The Gugerty Construction Company, St. Louis, has been incorporated with a capital stock of $15,000 by M. Gugerty, W. Moritz and R. P. Reilly, to equip for general contracting business.

The Kafir Products Company, Kansas City, Mo., has been incorporated with a capital stock of $100,000 by Fred C. Gay, A. R. Gibson and Howard McCutcheon and will equip for manufacturing.

The McKinley Traction Cultivator Company, St. Louis, maker of a new type of self-propelled agricultural implements, has completed plans for the capitalization of the company at $250,000, the increase having been decided upon after three years of development of the machine.

The city of Hannibal, Mo., has issued bonds in the amount of $350,000 for an extension of the city mains and for improving the city waterworks plant.

The Grand Center Motor Car Company, St. Joseph, Mo., has been incorporated with a capital stock of $15,000 by W. J. Hendler, H. R. Lewis and Louis Siegel, to equip a repair shop and garage.

The Tung-Lok Silo Company, Kansas City, Mo., has been incorporated with a capital stock of $250,000 by S. H. Chakten, Harris Hulen and C. O. Fields to equip a plant for the manufacture of patented silo stave.

The Great Western Paint Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by A. M. Hughes, N. S. Doran and J. B. Storey, and will equip a plant.

The recert announcement of plans at Jefferson City for a municipal electric light plant was preliminary to a bond issue election. The amount sought to be expended is $150,000. Burns & McDonnell, of Kansas City, are the engineers.

The Southwestern Milling Company, Kansas City, Mo., whose plant was recently burned with a loss of about $400,000, announces that it will be replaced as soon as possible.

An ice plant, to cost about $10,000, is to be established at Bunceton, Mo., by R. F. Wyan, O. N. Dills and J. Coleman.

A cold storage plant to cost about $10,000 will be equipped at Kansas City, Mo., by W. B. Strong, general manager of the Strong Line.

An ice plant of five tons daily capacity is to be equipped at Cassville, Mo., by A. L. Galloway and Fred Chaney.

The McIntire Ice Company, Fulton, Mo., has plans for the equipment of an ice plant of 10 tons daily capacity.

The ice plant of the De Soto Dairy, Ice & Fuel Company, De Sota, Mo., of which Lucas Duffner is president, will enlarge its capacity by the installation of considerable additional machinery.

An ice plant of about 15 tons capacity will be equipped at Holden, Mo., by Thomas Halsey and others, who will incorporate a company for the purpose.

The St. Louis-Joplin Lead & Zinc Company will rebuild and re-equip its concentrating plant and mill at Chitwood, Mo., recently burned with a loss of $18,000.

Reinert Bros., of St. Joseph, Mo., are reported in the market for steam mixers, rock crushers, side loaders, etc., with a capacity of about 800 yd. daily.

An ordinance has been passed at Heber Springs, Ark., providing for the construction of waterworks and sewage system, to cost about $80,000.

The Burnham Company, Murfreesboro, Ark., is completing its preparations for the installation of a plant for the preparation of clay and its manufacture, including plastic art clay, kaolin and china clay. The company is in the market for necessary equipment.

The State Agricultural College at Jonesboro, Ark., will rebuild the power plant which was burned recently with a loss of $15,000 on equipment.

The city of Marietta, Okla., is in the market for equipment for a waterworks plant, including a 225-hp. engine, a 150-kva. generator with exciter, a 100-gal. per min. deep well pump, a 300-hp. feed water heater and boiler feed pump and other equipment. The plans are in the hands of the Benham Engineering Company, Oklahoma City, Okla.

The State Board of Public Affairs, Oklahoma City, Okla., will build a school for the deaf at Sulphur, Okla., at a cost of $149,000, and a reformatory at Granite, Okla., at a cost of $125,000, both institutions to have independent heating, lighting, ventilating and power equipment.

The city of Strong City, Okla., under the direction of the mayor, has plans for the equipment of a waterworks plant, to cost about $20,000.

The Transcontinental Garage Company, Okmulgee, Okla., has been incorporated with a capital stock of $15,000 by A. J. and X. R. Gill and L. G. Bradfield, to equip a repair plant and garage.

The Boley Mfg. Company, Boley, Okla., has been incorporated with a capital stock of $10,000 by A. E. Bailey, M. J. Jones and M. W. Barnett, and will equip a manufacturing plant.

The Commerce Mining & Royalty Company, Miami, Okla., recently reported incorporated with a capital stock of $5,000,000, will develop 6000 acres of zinc and lead ore property. J. F. Robinson, C. M. Harvey, G. L. Coleman and others are interested.

The Wichita Pipe Line Company, operating in the Southwest, and headed by W. J. Rowland, of Pittsburgh, Pa., will construct a pipe line for gas from Bigheart, Okla., to the Cushing oil field in Oklahoma, including a compressor station with about 3000 ft. compression. Total expense will be $240,000.

The Gulfport Fertilizer Company, Gulfport, Miss., has plans for the addition to its plant of equipment for the manufacture of muriatic, oil of vitrol and salt cake.

The ice plant of the Holland Ice Company, at Clarksdale, Miss., recently burned, will be replaced, it is announced.

An ice plant with about five tons daily capacity will be built at Shubuta, Miss., by T. M. Spinks.

A planing mill with a capacity of 100,000 ft. of hardwood lumber will be equipped at Meridian, Miss., by Usher Bros.

The Griffin Lumber Company, of Nomac, Miss., will build a sawmill with a daily capacity of 60,000 ft., also a planing mill and kiln.

A factory for the manufacture of mattresses and excelsior will be equipped at Vicksburg, Miss., by J. L. Crudup, of Meridian, Miss.

Waterworks equipment of an undetermined quantity and character will be installed at McComb City, Miss., under the direction of the mayor.

The Cookville Veneer Company, Cookville, Tenn., which has been operating a mill for the manufacture of automobile spokes at Strongs, Miss., will establish another plant of the same kind near Jackson, Miss.

The Naylor Mfg. Company, Jennings, La., has been organized with a capital stock of $15,000, for the purpose of manufacturing a patent harrow, invented by C. A. Naylor, of Jennings. J. J. Roberts, of Jennings, is president of the company.

The Houma Cypress Company, Houma, La., is in the market for equipment for the purpose of extending its plant.

The Bayou Jack Lumber Company, New Orleans, La., has been incorporated with $50,000 capital by Conrad B. Fischer, Fred Fischer and Harmon Hoey, to equip a mill at once.

A freight station at New Orleans, La., with considerable mechanical equipment, to cost about $200,000, is planned by the Louisville & Nashville Railroad.

The Dunlap Electric Company, Plaquemine, La., has plans for the equipment of an ice plant in connection with its electric plant.

A fertilizer manufacturing plant with equipment, to cost about $50,000, is planned to be built at Shreveport, La., by Swift & Co., Chicago.

The electric light plant at Franklinton, La., has been bought by T. J. Hood, who has plans for considerably increasing its equipment.

Texas

AUSTIN, TEXAS, October 25, 1913.

The waterworks system at Bay City is to be equipped with automatic pumping machinery. The two old gas engine pumps will be retained for emergencies.

A waterworks system is to be constructed at Killeen, a bond issue of $17,000 having been voted.

The Pendleton Water Company, Pendleton, has been organized to construct a waterworks plant and distributing system.

The Jones County Oil & Gas Company has been organized at Stamford to develop an extensive oil and gas field recently discovered in that vicinity. The incorporators are R. F. Jones, R. F. Penick, L. M. Buie, J. S. Morrow and others, all of Stamford. A number of other companies are being organized.

The Farmers' Gin Company, Carrollton, has been organized for the purpose of erecting a cotton gin. W. F. Vinson, of Dallas, is one of the incorporators.

The Velasco Gin & Power Company, Velasco, has been formed with a capital stock of $7500 and will construct a cotton gin. D. T. Austin, of Velasco, is one of the incorporators.

The W. C. Ling Company, San Antonio, has been organized to develop a large stone quarry.

The Saner-Ragley Lumber Company, Carmonia, has been incorporated with a capital stock of $200,000 and a large mill will be erected. J. M. Bemis, of Warren, Pa.; W. G. Ragley, Ragley, Tex., and John C. Saner, of Dallas, Tex., are the incorporators.

The city waterworks plant at Goliad, Texas, was destroyed by fire on October 19, the loss being estimated at $25,000.

The city of Pendleton, Texas, has incorporated the Pendleton Water Company with $4000 capital to build and operate a city waterworks plant.

The Albuquerque Foundry & Machine Works, Albuquerque, N. M., is in the market for apparatus for the pulverizing and firing of steam coal.

Eastern Canada

TORONTO, ONT., October 25, 1913.

The American Road Machine Company of Canada, Ltd., Goderich, Ont., advises that the main shop of the new plant is to be 70 x 400 ft., instead of 70 x 100 ft., as stated last week.

Exeter, Ont., has voted to loan $10,000 to the Exeter Mfg. Company, a new foundry corporation. The new industry is a branch of a company in the United States.

W. C. Hawkins, managing director of the Dominion Power & Transmission Company, Hamilton, Ont., has made official announcement that his company has completed arrangements to build an auxiliary plant at the foot of James street on the bay front, to develop 90,000 hp., the plant and equipment to cost $3,500,000. It will be one of the largest steam electric plants in the country, and will supply power sufficient for all the needs of the city, the electric railways that radiate from the city, and probably to all the municipalities supplied by subsidiaries of the Dominion Power & Transmission Company.

George Whitesides, of Toronto, will locate a paper box factory at Stratford, Ont.

The Westbury Electric Light & Power Company, Cookshire, Que., has been incorporated with a capital stock of $75,000 by H. W. Worby, G. W. Allard and others.

The Saint Martin Lumber Mfg. Company, Ltd., Saint Martin, Que., has been incorporated by J. A. E. Decelles, J. W. Lavoie and others.

The National Transcontinental Railway shops will be erected at St. Malo, Que., where the company has secured 200 acres, instead of at St. Foye, as originally planned. The St. Foye site will be used as a freight yard.

The Scroggie Furniture Company, Ltd., Montreal, has been incorporated with a capital stock of $100,000 by Arnold Wainwright, Maurice Alexander and others, to manufacture furniture.

The proposition to electrify the London & Port Stanley Railway, at a cost of $700,000, was carried by the ratepayers of London, Ont.

The Kellogg Toasted Corn Flakes Company, London, Ont., is erecting a four-story addition to its plant, to cost about $25,000.

The Canadian Westinghouse Company has completed plans for the erection of an additional factory building at Hamilton Ont., of reinforced concrete, to cost $150,000.

The Sawyer-Massey Company, Hamilton, Ont., has let the contract for the construction of an addition to its foundry building.

Western Canada

WINNIPEG, October 24, 1913.

A fair demand for machinery in comparatively small orders is reported, but few big contracts are being made. Manufacturing plants throughout the West are continually buying parts for repairs and extensions, and although the situation is quieter than a year ago a considerable volume of business is being done in the aggregate. The general financial conditions are gradually improving, and prospects favor greater industrial activity in the near future. Building of new plants and extensions will not be active for some time, but plans are being prepared for a great deal of structural work next spring.

The elevator of the Ogilvie Flour Mills Company, Ltd., at Fort William, Ont., will undergo material changes in the near future. The shipping facilities will be enlarged to a capacity of 20,000 bu. of grain per hour.

The Department of Trade and Commerce, Ottawa, is calling for tenders for the preparation of plans to be used in connection with the proposed government terminal elevator at Port Nelson, on Hudson's Bay, the terminus of the Hudson's Bay Railway now under construction. These tenders must be in by November

5, and are for an elevator with a capacity of 1,500,000 bu. Tenders for the structure will be called for shortly afterward.

A by-law has been passed by the Winnipeg City Council calling for a vote of the ratepayers on the expenditure of $1,000,000 for extension to the hydroelectric system of the city.

The Town Council of Yorkton, Sask., will erect a power house, at a cost of $36,000. F. T. Acheson is clerk and Ritchie & Watters the contractors.

The Joseph Chew Lumber Company, Vancouver, B. C., contemplates building a sawmill at Craycroft Island, B. C.

Senator Edwards, Toronto, and associates are preparing to build a large sawmill at Dowe Creek, B. C.

The Weeks Dunell Cedar Company, Ltd., Fanny Bay, B. C., has been incorporated, and will build a shingle mill.

The Canadian Collieries, Ltd., Victoria, B. C., has decided to install an electrically driven pumping system. There will be four separate units, two of which will be driven by 75-hp. alternating current motors, and the third by a 75-hp., direct current motor, each unit being capable of delivering 350 gal. per minute against a head of 370 ft.; the fourth unit, consisting of two pumps working in series, will deliver 350 gal. per minute against a head of 740 ft.

The Mick Removable Bar Cylinder Company, Ltd., Redcliffe, Alberta, has been incorporated with a capital stock of $500,000 by W. D. Hale, J. W. Tinnall and others.

Medicine Hat, Sask., has voted a free site, free gas and water to the Western Threshing Machine Company. The company is capitalized at $100,000, and work will be started on the manufacture of threshing machines as soon as possible. J. F. Davies is president; V. W. Parrish, secretary, and H. B. Yuill, treasurer.

The B. C. Pottery Company, Ltd., has plans under way for the construction of a new plant, at a cost of about $125,000, on the site of the old factory at Esquimalt, B. C., near Victoria, recently destroyed by fire.

Government Purchases

WASHINGTON, D. C., October 23, 1913.

Bids will be received until November 11 by the paymaster-general of the Navy, schedule 5940—Steam Engineering; for furnishing the following: class 1, Mare Island—One portable electric welding apparatus; class 1, alternate—f. o. b. works.

Bids will be received by the Bureau of Supplies and Accounts, Washington, until November 11, under schedule 5951 for a 42-in. power squaring gap shears for Philadelphia; under schedule 5963 for four ventilating fans complete with motors, for Philadelphia; under schedule 5967 for eight portable electric hand drills, 125 volts; and for 12 4-ton hydraulic jacks having a 12-in. raise; until November 18, under schedule 5958, for six steel furnaces for Mare Island.

Bids will be received until November 1 by H. R. Standford, chairman of the Bureau of Yards and Docks, Navy Department, Washington, for a power house for the United States Radio Station, Jupiter, Fla.

Bids were received October 9 at the United States Reclamation Service, Los Angeles, Cal., for furnishing pumping units for the Sun River project as follows:

Item 1, 2-in. direct-connected pumping unit; 2, 3-in. direct-connected pumping unit; 3, for both items.

Krogh Mfg. Company, item 1, $172, weight 550 lb.; 2, $294, weight 1200 lb.; at San Francisco, 10 days.

United Iron Works, item 1, $190, weight 630 lb.; 2, $328, weight 1220 lb.; at Oakland, Cal., six days.

Byron-Jackson Iron Works, item 1, $233, weight 750 lb.; 2, $365, weight 1500 lb.; West Perkeley, Cal., 21 days.

D'Olier Centrifugal Pump & Machine Company, item 3, $636, total weight 2000 lb.; at Philadelphia, 35 days.

Terry Engineering Company, item 1, $280, weight 1120 lb.; 2, $400, weight 1425 lb.; at Los Angeles, 14 days.

C. F. Braun & Co., item 1, $297, 900 lb.; 2, $444, 1600 lb.; at Newburgh, N. Y., 68 days.

Bids were received October 20 by the United States engineer, Philadelphia, Pa., for furnishing Scotch marine boilers as follows:

International Boiler Works, alternate bid, Vidette, $7500.

S. Freeman & Sons Mfg. Company, alternate bid, Vidette, $4650.

Spedden Shipbuilding Company, $24,314; alternate bid, Vidette, $6946; Cataract, $17,374.

New York Shipbuilding Company, $15,000; alternate bid, Vidette, $4259; Cataract, $10,750.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, October 21 for supplies for the navy yards as follows:

Schedule 5864—Steam Engineering.

Class 1, Puget Sound—One Tropena steel casting plant, baby furnace—Bid 141, $4416.

Class 1, Alternate—F. o. b. works—Bid 129, $5973.80.

Class 2, Puget Sound—One 4000-lb. brass melting and refining furnace—Bid 6, $2259 and $1452; 50, $2044.45; 75, $2055 and $2474; 83, $2436.

Class 2, Alternate—F. o. b. works—Bid 6, $1821 and $1408; 50, $1525; 75, $1675 and $2100; 83, $2100.

Class 3, Puget Sound—One pneumatic core jarring or jolt ramming machine—Bid 2, $110.50; 75, $122; 76, $90.

Class 3, Alternate—F. o. b. works—Pid 75, $112.

Class 4, Puget Sound—One Sand blast outfit—Bid 6, $681 and $987; 75, $877; 81, $500; 105, $650.

Class 4, Alternate—F. o. b. works—Bid 6, $640 and $897; 75, $810; 81, $500; 149, $840.

Class 5, Puget Sound—One 36-in. blade power cut-off saw—Bid 75, $1317 and $1398; 92, $2012, $2398, $1669 and $2026; 98, $1787.

Class 5, Alternate—F. o. b. works—Bid 75, $1152 and $1231; 98, $1498.

Class 6, Puget Sound—One oblique brass water tumbler—Bid 63, $111 and $90; 75, $95.

Class 6, Alternate—F. o. b. works—Bid 63, $82.80 and $62.80; 75, $80.

Class 7, Puget Sound—One exhaust tumbling barrel for gray iron castings—Bid 105, $625; 141, $590.

Class 7, Alternate—F. o. b. works—No bids.

Class 8, Puget Sound—One core sand-mixing machine—No bids.

Class 8, Alternate—F. o. b. works—No bids.

Class 9, Puget Sound—One core wire straightening machine—Bid 17, $458; 75, $445 and $500.

Class 9, Alternate—F. o. b. works—Pid 17, $405; 75, $424 and $479.

Class 10, Puget Sound—One direct motor-driven grinding machine—Bid 63, $170.85 and $182.85; 75, $210.

Class 10, Alternate—F. o. b. works—Bid 63, $155.85 and $165.85; 75, $185.

Class 11, Puget Sound—Two 6-beam foundry charging scales—Bid 38, $150; 126, $172.

Class 12, Puget Sound—One combined crusher and pulverizer—Bid 28, $1200 and $1125 (alt.); 33, $945; 105, $1250; 155, $810 (alt.).

Schedule 5887—Steam Engineering.

Class 51, Norfolk—One motor-driven spiral disk grinder—Bid 11, $980; 43, $928 and $948; 75, $980 and $800; 113, $870.

Schedule 5888—Steam Engineering.

Class 52, Boston—One motor generator set—Bid 47, $1411.75; 62, informal.

Schedule 5892—Construction and Repair.

Class 81, Furnishing and erecting two 10-ton 3-motor electric overhead traveling cranes—Postponed to November 4.

The names of bidders and the numbers under which they are designated in the above list are as follows:

2. Arkay Mfg. Company.
6. Berger & Carter Company.
11. Charles H. Pesly.
17. Blake & Knowles Steam Pump Works.
28. N. K. Davis Machine Works.
33. Excelsior Tool & Machine Works.
38. Fairbanks, Morse & Co.
43. Gardiner Machine Company.
47. General Electric Company.
50. Hawley Down Draft Furnace Company.
62. L. B. Johnson.
63. Kemp Machinery Company.
75. Manning, Maxwell & Moore.
76. Mumford Molding Machine Company.
81. McLeod Company.
83. Monarch Engineering & Mfg. Company.
92. Newton Machine Tool Works.
98. Niles-Bement-Pond Company.
105. I. W. Paxson Company.
113. Swind Machinery Company.
126. Standard Scale & Supply Company.
129. Tropenas Converter Company.
141. Whiting Foundry & Equipment Company.
149. Wm. E. Williams.
155. Phillips & McLaren Company.

A circular herringbone gear has been developed by the R. D. Nuttall Company, Pittsburgh, Pa. The developed outline of the tooth top across the face is a continuous circular arc, which approximates the outline of the regular herringbone tooth. At the middle of the face the tooth profiles are true involutes, and while the others may vary slightly, they are, nevertheless, close approximations to the involute form. The addendum is 0.25, the dedendum 0.25, the clearance 0.05, the working depth 0.5 and the entire depth 0.55 of the circular pitch. At the middle section, parallel with the edge, the pressure angle is 20 deg.

The Reynolds Aluminum Company is the name of a new concern that has about completed a plant in New Washington, Ohio, for the manufacture of aluminum household specialties. Frank W. Reynolds is at the head of the enterprise. The Reynolds Pattern Company, Mansfield, Ohio, has been moved to New Washington, where it will be operated in connection with the aluminum plant.

The Thatcher-Rueter Mfg. Company, Cleveland, Ohio, maker of dies, tools, sheet metal stampings and hardware specialties, has been reorganized. James C. Thatcher, who has not been actively connected with the company for some time, has been elected president and general manager, and Julius P. Pryer and James A. Farrell have been added to the board of directors.

Trade Publications

Pipe Welding.—M. W. Kellogg Company, 50 Church street, New York City. Pamphlet. Describes the way in which flanges, nozzles, sections of pipe, etc., are welded by fire or with an electric welding machine. A feature of the pamphlet is the illustrating of a large number of different fittings which have been made by this company.

Boiler Tube Cleaners.—Lagonda Mfg. Company, Springfield, Ohio. Catalogue M. Size, 7½ x 10 in.; pages, 24. Deals mainly with externally-driven mechanical cleaners for removing scale from the tubes of boilers, condensers, economizers, etc. The harmful effects of scale in boilers and the benefits accruing from its periodic removal are also touched upon, and there are a large number of illustrations showing how the cleaner has been adapted to meet conditions existing in different plants.

Riveting Hammers and Core Drills.—Ingersoll-Rand Company, 11 Broadway, New York City. Bulletin No. 8011 and pamphlet No. 632. The first shows a new line of riveting hammers suitable for structural, tank, steel or any other similar work where rivets up to 1¼ in. in diameter are to be driven. The illustrations in the bulletin show the hammer at work, and there is a line drawing illustrating the construction. The pamphlet is descriptive of the Calyx line of core drills and shows the different styles of machines. Tables giving the capacities of the various sizes are included.

Stone Working Machinery.—F. R. Patch Mfg. Company, Rutland, Vt. Catalogue H. Illustrates and describes machinery for use in the working and finishing of stone. These include saws of various types, roughing beds, planing and polishing machines, lathes, etc. Directions for erecting and operating the saws are given and mention is made of some of the appliances used, such as cranes, jacks, derricks, hoists, etc.

Jacks and Trench Braces.—Duff Mfg. Company, Pittsburgh, Pa. Three bulletins and catalogue H. Each of the bulletins is devoted to a special type of jack, such as a high-speed, ball bearing screw jack with fast operating lowering mechanism, an emergency car jack and a ball bearing journal jack. Descriptions of the different jacks are given, the text being supplemented by illustrations of the jacks themselves and also in use. The catalogue calls attention to two types of extensible trench braces, which can be supplied in a number of different sizes. Views of the several styles of brace are given, together with views of them in use.

Metal Working Machinery.—Fox Machine Company, Grand Rapids, Mich. Collection of circulars. Give general description and specifications for a line of metal working machinery, which includes hand and power feed miling machines, a pipe cutting machine and multi-spindle and radial drilling machines. The circulars are all identical in makeup, a view of the particular machine described with a condensed table of specifications being given on the first inside page, while a description which is supplemented by drawings or views of some particular part is found on the facing one.

Planing Machines.—Woodward & Powell Planer Company, Worcester, Mass. Circulars B-2, C-1, DM-1, D-2, F-1, GM-1, G-1, and Z-1. Lists a line of planing machines which are made in sizes for handling work ranging from 24 x 24 in. up to 42 x 42 in. The circulars are all identical in makeup, a view of the particular machine being given on one of the inside pages, while the description is found on the facing one. Mention is also made of chucks for use in connection with these machines and a fluting machine for fluting or grooving the feed rolls used in textile machinery.

Feed Water Heaters and Oil Separators.—Benjamin F. Kelley & Son, 25 Church street, New York City. Pamphlet and circular. The first contains a description of the Standard feed water heater and shows how the use of one of these heaters will reduce the amount of work required from the boiler. A number of views of the heater are given, together with drawings showing the different arrangements of the exhaust nozzles which can be supplied. Directions for installing the heater are also included. The circular refers to the company's grease extractor and oil separator, which is designed to purify the water of condensation, so that it can be used for boiler feeding purposes. An engraving of the separator with the various parts lettered for identification and a table of dimensions are included.

Friction Clutches.—W. E. Caldwell Company, Louisville, Ky. Catalogue No. 1. Relates to a line of friction clutches, clutch pulleys and couplings, which can be supplied in a wide range of sizes. Views of the various devices are given, together with tables of the sizes in which they can be supplied. Mention is also made of fulcrum stands for friction clutches which are built in both the plain and geared types.

Time Stamp.—Automatic Time Stamp Company, 160 Congress street, Boston, Mass. Pamphlets and circulars. Illustrate a line of computing automatic time stamps for use in factories and other places where it is desirable to have a record of the elapsed time required for any operation or the time papers, etc., were received. These devices are made in several forms for mounting on a bench or against the wall or as a portable outfit. Reproductions of the various impressions made by these stamps are also shown in great variety.

Motor-Driven Fire Apparatus.—Waterous Engine Works Company, St. Paul, Minn. Catalogue. Pertains to a line of motor-driven fire apparatus, which includes pumping engines, hose wagons, chemical engines and combinations of all three. Views of the various pieces of apparatus which can be furnished are given, together with brief descriptions and condensed tables of specifications. Special attention is called to the rotary and four-cylinder piston pumps which are furnished for use with this equipment and mention is also made of a gasoline fire engine arranged for hand or horse draft, which is designed for use in industrial establishments.

Screws, Bolts, Rivets, Taps and Gauges.—Reed & Price Mfg. Company, Worcester, Mass. Catalogue and illustrated price list. Treat of a large line of the company's products in various sizes and shapes, including many special screw machine products. Micrometer calipers and sets, end measures, thread gauges, etc., are included. Directions for reading micrometers and interesting and instructive tables are given.

Gas Furnace Appliances.—American Gas Furnace Company, 24 John street, New York City. Catalogue, seventh edition, supplement No. 2 and two bulletins. The illustrated catalogue treats of the American oil gas machine, pressure blowers, gas blast furnaces and other gas appliances. The supplement treats of gas blast furnaces for hardening high speed tools. One bulletin relates to an electric automatic heat controller for use in connection with hardening, tempering and annealing and is a reprint from *The Iron Age* of June 8, 1911. The other bulletin is a well illustrated, interesting description of a new process of case hardening by gas. The operation is performed in a slowly revolving heated retort into which carbonizing gas is ejected under pressure. Unusual uniformity and speed is claimed for this process.

Carriage Fixtures.—D. Wilcox Mfg. Company, Mechanicsburg, Pa. Supplement to catalogue No. 11. Contains a partial list of goods not before catalogued, including special shapes and sizes of axe and bar clips, shaft irons, canopy standards, etc.

Music Wire Straightening and Bundling Machine.—Sleeper & Hartley, Worcester, Mass. Bulletin No. 272. Shows a machine which is designed for preparing music wire for use in automatic machines. One of the special features of the machine is a novel type of flyer, which is combined with a collapsible bundling reel. An illustrated description of this machine appeared in *The Iron Age*, October 2, 1913.

Air Compressors and Pumps.—Gleason-Peters Air Pump Company, 255 Classon avenue, Brooklyn, N. Y. Catalogue No. 50. Covers a line of vertical and horizontal air compressors with different numbers of cylinders and several styles of pumps. All of these are illustrated and briefly described. Mention is also made of a number of accessories, such as valves, tanks, gauges, etc.

Flexible Shafting.—Stow Mfg. Company, Binghamton, N. Y. Catalogue No. 13. Concerned with the Stow flexible shaft and its various applications. A description of the shaft is given, and there are a number of views showing it in use in connection with the company's portable and pedestal drilling machines and various types of grinding and polishing machines.

Drop Forgings.—Otto Konigslow Mfg. Company, Cleveland, Ohio. Collection of circulars. Illustrates some of the various kinds of forgings which this company can supply. These include starting cranks, speed control sets, ignition levers, rocker shafts, clutches and radiator fans. A separate circular is devoted to each forging, there being simply an illustration with a few dimensions and the name of the firm.

Mechanical Stokers.—Detroit Stoker Company, Detroit, Mich. Pamphlet. Contains views of a number of installations of this stoker, together with drawings, showing its application to different types of boilers. A description of the stoker, with a number of views of the different parts, is included. An illustrated description of this stoker appeared in *The Iron Age*, February 9, 1911.

Metal Sawing Machines.—Higley Machine Company, Cohoton Falls, N. Y., Vandyck Churchill Company, New York City, general selling agent. Collection of loose leaf circulars. The first circular refers to the special features of this company's machine, such as the use of a sprocket wheel drive and an automatic friction feed. The advantages of these two features are briefly touched upon, after which all of the different machines are illustrated with brief text descriptions and condensed tables of specifications. In addition to the metal sawing machines, mention is also made of a line of saw grinding machines.

Chucks.—E. Horton & Son Company, Windsor Locks, Conn. Catalogue No. 12. Treats of a large line of chucks of all kinds, including lathe and drill chucks, face plate jaws and the Morrow ball-bearing self-tightening drill chuck. All of the chucks are illustrated and briefly described with halftone engravings and in some cases line drawings to show the construction. A number of condensed tables of specifications are also included.

Bolt and Nut Machinery.—H. B. Brown Company, East Hampton, Conn. Catalogue No. 14. Lists a number of different types of bolt cutting, tapping, pointing and heading machines. All of these are illustrated and briefly described, and instructions for using the bolt cutting machine are given. Descriptions of the bolt cutter head and the die used on these machines are given, together with a list of the sizes in which the dies can be furnished.